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American Foundryman

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March
1942

Steel Castings Gain Warranted Recognition

THE present emergency is not the first time that steel foundries have been pushed to capacity. This time, however, there is a difference, for steel castings are in urgent demand in entirely new fields of usefulness. Among these are the most exacting and particular service of materiel for our armored forces. In this use steel castings have won their place by sheer force of merit. Take tank armor for example. Ballistic tests rate cast steel as the equal of wrought steel in properties, but, when the ease of formability and the economy of weight with maximum protection is considered, steel castings are unequalled. The advent of cast armor effected revolutionary changes in the design and construction of tanks.

But this is only a more recent use of cast steel. When one considers how steel castings have proven their merit as materials of engineering construction in such difficult dynamic services as railroad side frames, bolsters and couplers, to mention only a few such cases, it is somewhat surprising to find professors of metallurgy who teach that cast steel is an inferior product and designing engineers who seem to rate it as, at best, a material that is sometimes cheaper and more convenient to use but a less desirable substitute for wrought products.

Let the foundryman question himself as to how far he is responsible for this attitude. It does seem sometimes as though the foundryman has had a slight inferiority complex in regard to his product and has not been aggressive enough to offset unwarranted encroachments of other materials. The combined efforts of the foundry industry, working in co-operation, should be able to maintain castings in their present prominent position. It is the avowed function of the Steel Division to acquire and disseminate information that will help this effort. This is probably the best way to attain the maximum contribution of castings to the war program.

C. E. Sims

C. E. SIMS, Chairman,
A.F.A. Steel Division Committee

The author of this editorial, C. E. Sims, is supervisor of alloy steel research, Battelle Memorial Institute, Columbus, Ohio. He is serving as general chairman of the Association's Steel Division Committee; chairman of the Steel Division Advisory Committee and Committee on Methods of Producing Steel for Castings, and a member of the Steel Division Committee on Handbook Revision. He also represents A.F.A. on A.I.M.E. Open-Hearth Committee. Mr. Sims has lectured before many of the Association's chapters and has prepared various papers concerning steel production for conventions and the technical press. He is a graduate of the University of Illinois and the University of Utah. Prior to taking a position with Battelle Memorial Institute in 1936, Mr. Sims worked for such companies as the American Steel Foundries, the Anaconda Copper Co., Michigan Electrochemical Co., Aluminum Company of America and the U. S. Bureau of Mines.

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Production Problems and Their Solution To Be Emphasized at Cleveland Convention

PLANS for the Western Hemisphere Foundry Congress in Cleveland, April 20-24, are rapidly shaping up toward a vigorous demonstration of the part played by the castings industry in waging and winning the war. Every phase of the intensive program—exhibits, technical sessions, Ordnance displays, government participation, and educational talks by Army, Navy and other government officials—will emphasize the problems involved in castings production for wartime needs.

Exhibits to Assist Foundries' War Efforts

Because of the immediate demand for increased industrial production, the first Western Hemisphere Foundry Congress and Foundry and Allied Industries Show will comprise a true "win the war" convention, and one of the most important meetings ever staged by and for the foundry industry. The thousands of foundrymen who attend will be seeking accurate data to help them do a better job. The speakers will tell them how and the equipment exhibited will show them how.

Frank J. Dost, Sterling Foundry Co., Wellington, Ohio, Chairman, General Convention Committee.

John H. Tressler, Hickman, Williams & Co., Cleveland, Ohio, General Vice Chairman, General Convention Committee.

This war character and purpose will be especially noticeable in the exhibit halls. Manufacturers of equipment and supplies are planning to key their displays to assisting foundrymen to increasing production and improving quality. Conservation of materials, durability of equipment under high production schedules, adaptation and more efficient use of present equipment and protective devices for the foundry also will be featured by exhibitors.

Government Co-operation to Be Co-ordinated

Displays of cast parts in the Ordnance exhibits, sponsored by the Cleveland Post of the Army

Tentative Schedule of Sessions First Western Hemisphere Foundry Congress

46th Annual Convention, American Foundrymen's Association
Cleveland, Ohio, April 20-24

Monday, April 20

11:00 A.M.	Opening Meeting
2:30 P.M.	(a) Non-Ferrous Session
	(b) Malleable Session
4:30 P.M.	Core Practice Lecture Course
5:00 P.M.	Reception for Guests from Central and South American Countries
8:00 P.M.	(a) Patternmaking Session
	(b) Western Hemisphere Congress Session—Papers Presented from Central and South American Countries

Tuesday, April 21

9:00 A.M.	(a) Sand Shop Control Instruction Course
	(b) Gray Iron Shop Instruction Course
10:00 A.M.	(a) Malleable Session
	(b) Non-Ferrous Session
	(c) Apprentice Training Session
11:45 A.M.	Special Session on War Production Problems
12:30 P.M.	(a) Non-Ferrous Round Table Luncheon
	(b) Malleable Round Table Luncheon
2:30 P.M.	(a) Malleable—Symposium on Graphitization, Section 1
	(b) Patternmaking Session
	(c) Foreman Training — Round Table Discussion
4:30 P.M.	Core Practice Lecture Course
6:30 P.M.	Apprentice Instructors' Dinner
6:30 P.M.	Non-Ferrous Division Dinner
8:00 P.M.	Refractories Session

Wednesday, April 22

9:00 A.M.	(a) Sand Shop Control Instruction Course
	(b) Gray Iron Shop Instruction Course
10:00 A.M.	Business Meeting and Awards Lecture
2:30 P.M.	(a) Safety and Hygiene Session
	(b) Gray Iron Session
	(c) Steel Session
4:30 P.M.	Core Practice Lecture Course
6:30 P.M.	(a) Chapter Officers' Dinner
	(b) Foundry Instructors' Dinner
8:00 P.M.	(a) Engineering School Instruction in Foundry Practice
	(b) Job Evaluation and Time Study Session
	(c) Steel Session

Thursday, April 23

9:00 A.M.	(a) Gray Iron Shop Instruction Course
	(b) Sand Shop Control Instruction Course
10:00 A.M.	(a) Sand Research Session
	(b) Foundry Costs and Merchandising Castings
11:45 A.M.	Special Session on War Production Problems
12:30 P.M.	Steel Division Round Table Luncheon
2:30 P.M.	(a) Gray Iron Session
	(b) Plant and Plant Equipment
4:30 P.M.	Core Practice Lecture Course
7:00 P.M.	Annual Dinner

Friday, April 24

9:00 A.M.	(a) Sand Shop Control Instruction Course
	(b) Gray Iron Shop Instruction Course
10:00 A.M.	(a) Steel Session
	(b) Gray Iron Session
	(c) Sand Research Session
11:45 A.M.	Special Session on War Production Problems
2:30 P.M.	(a) Steel Session
	(b) Gray Iron Session
4:30 P.M.	Core Practice Lecture Course

Jack Lathrop, The Foundry, Cleveland, Ohio, General Secretary, General Convention Committee.

Russell F. Lincoln, Osborn Mfg. Co., Cleveland, Ohio, General Treasurer, General Convention Committee.

Ordnance Association, will demonstrate the type of work adapted to production in America's foundries. At the same time, both the War Production Board and the Office of Price Administration will have representatives present for consultation on problems involving government regulations concerning priorities and contract distribution.

Government co-operation in the important work of training men for wartime production will be further evidenced in displays by the Department of Labor. Bureau Mines exhibits will stress safety. Aspects of hemisphere solidarity will be illustrated in displays of the Office of Co-ordination of Inter-American Affairs.

Technical Sessions Emphasize Production

Major theme of the unusually heavy program of papers on important technical problems will be the use of methods and equipment for increasing castings output. Outstanding men of the industry will make valuable contributions on many phases of foundry practice. Arrangements also are being completed for a series of talks, each day throughout the convention, by Army, Navy and government officials on what will be required of foundries "for the duration."

Special arrangements are being made for participation of visitors from the Central and South American countries, beginning with a reception for guests from our Latin neighbors, the first evening of the convention. One technical session will be devoted to presentation of papers by foundrymen of those countries, including exchange papers from Brazil and Mexico.

WPB and OPA to Establish Own Consulting Offices at Congress

As a service to foundrymen planning to attend the 1942 convention, A.F.A. is pleased to announce that "the government is coming to the industry" at the Cleveland show. Both the War Production Board and the Office of Price Administration are planning to establish offices at the convention, manned by their own representatives, in order to help foundrymen solve their problems of wartime production without red tape. Assurance has been given that these offices will co-operate to the fullest in answering questions pertaining to contracts, priorities and pricing of cast products.

WPB will maintain three separate offices, as follows:

Materials Division—Priorities for foundry equipment.
Materials Division—Priorities for foundry materials.
Production Division — Contract distribution.

Two offices of OPA's Division of Price Administration will be maintained, dealing separately with:

Non-ferrous castings problems.
Ferrous castings problems.

Thus the 1942 Foundry Congress will provide opportunity to discuss all major phases of increased castings production. Ordnance exhibits will show foundrymen what they can make—WPB and OPA representatives will help them obtain contracts and materials—the technical sessions and exhibits of equipment and supplies will demonstrate the best in production methods and practices.

Training a Major Problem Today

In view of the fact that there will be further major changes in personnel in the foundry industry and an increase in the need for skilled workmen, the important subject of training workers will be discussed at length. The A.F.A. Apprentice Training Committee will present at its meeting two speakers on meeting specialized training problems—W. F. Patterson, Federal Committee on Apprenticeship, and Donald F. Lane, Director of Training, Bethlehem Steel Co., Sparrows Point, Md. O. F. Carpenter of the Federal Division on Training Within Industry, will direct discussion on intensive training methods. Foreman training will be discussed at a round-table meeting, and training in engineering schools is to be emphasized by the report of the A.F.A. Committee on Co-operation with Engineering Schools, which will be a summary of a survey of foundry training.

Leon F. Miller, Osborn Mfg. Co., Cleveland, Ohio, Chairman, Banquet Committee.

W. L. Seelbach, Forest City Foundries Co., Cleveland, Ohio, Vice Chairman, Banquet Committee.

Tom Johnston, Republic Steel Corp., Cleveland, Ohio, Chairman, Hotel Committee.

J. C. Maher, The Ohio Foundry Co., Cleveland, Ohio, Vice Chairman, Hotel Committee.

Wartime Protection of Plants and Workers

A most timely and interesting report will be presented by the Association's Committee on Recommendations for Plant Defense and Protection, under chairmanship of Jas. R. Allan, International Harvester Co. Recommendations to be discussed have been developed in co-operation with the Board of Civilian Protection, Office of Civilian Defense, and embodies also the experience of foundries in England during the war.

The series of lectures on core production begun at the 1941 A.F.A. convention will be continued this year and will be given by H. W. Dietert, H. W. Dietert Co., Detroit, Mich., in four sessions. The material presented in these lectures will be available in book form by convention time.

The problem of increasing productive man-hours through more efficient use of present equipment and personnel will be considered at one important ses-

Edwin Bremer, The Foundry, Cleveland, Ohio, Chairman, Publicity Committee.

R. C. Wellman, The Foundry, Cleveland, Ohio, Vice Chairman, Publicity Committee.

sion. E. L. Berry, Link Belt Co., will discuss methods of job evaluation and time study developed by his company.

Sand Problems Well Covered

Four convention sessions will be devoted to discussions on the fundamentals of sand shop control, under chairmanship of W. G. Reichert, American Brake Shoe and Foundry Co., Mahwah, N. J. In addition, A.F.A. committee activities in sand research will be continued by presentation of papers dealing with such subjects as dry sand molding, synthetic sands, sea coal in foundry sands, resin binders, flowability of molding sands, and sand durability. These sessions will be well attended.

How cost methods are affected by conditions now confronting the industry will be discussed at a round-table discussion of the Committee on Foundry Costs, of which R. L. Lee, Liberty Foundry division, Grede Foundries, Inc., Milwaukee, Wis., is chairman.

Full Program on Patternmaking

Two sessions of the Patternmaking Division of A.F.A. are scheduled this year. Papers presented will deal with such subjects as equipment for core blowing, copper castings production, pattern lumber specifications, topping cores, and reports will be included on plastic and rubber coatings for core boxes and patterns.

Ray Fleig, Smith Facing & Supply Co., Cleveland, Ohio, Chairman, Finance Committee.

Homer Britton, Cleveland Co-operative Stove Co., Cleveland, Ohio, Vice Chairman, Finance Committee.

The session on Plant and Plant Equipment, under chairmanship of James Thomson, Continental Roll & Steel Foundry Co., East Chicago, Ind., will feature a discussion of priorities in relation to the purchase of foundry equipment. An interesting paper also will be presented on a new method of cleaning gray iron castings.

A number of timely papers on production of steel castings for war materials will be offered at the four sessions of the Steel Division, including a round-table discussion under the leadership of R. S. Munson, Atlantic Steel Casting Co., Chester, Pa. Papers scheduled will deal with refractories, iron oxide in cores, grinding steel castings, gating and risering techniques, centerline shrinkage, electric and open-hearth melting practices, with one paper on basic electric and side blow practices in England, low alloy copper steels, and welding carbon steel castings. Committee reports also will be presented on the magnetic powder test, radiography, and methods of producing steel for castings. These reports will be very popular with steel casting producers.

Extensive Gray Iron Sessions

Under direction of the Gray Iron Division, four of the popular gray iron shop course sessions will be held, specializing on shrinkage fundamentals. At the regular sessions on metallurgy and research, papers will be presented on melting practice, graphitization, strength versus structure, glass forming molds, hardening methods, alloying cast iron, austenitic iron, elasticity, and the effects of phosphorus on cast iron growth.

Reports on Cupola Research

Several reports will be presented by the Cupola Research Committee, D. J. Reese, International Nickel Co., chairman, offering for discussion material intended for the handbook of cupola operation. The reports, prepared by subcommittees of the project, will be subject to further revision before the handbook is printed and ready for distribution to America's foundrymen.

Two of the three sessions scheduled under the Malleable Division of A.F.A. will be given over to a symposium on graphi-

Inspecting a magnesium airplane casting, one of the thousands of essential parts being produced by the castings industry for vital wartime needs.

J. J. Wittenhafer, Lake City Malleable Co., Cleveland, Ohio, Chairman, Welcoming Committee.

F. A. Stewart, National Malleable & Steel Castings Co., Cleveland, Ohio, Vice Chairman, Welcoming Committee.

tization. The ten speakers taking part in the symposium will discuss principles of graphitization, suppression of graphite, hydrogen and the time factor, temperature control and various methods of annealing practice and control. At the third malleable session papers will be presented on gating and risering, and sand control.

Heavy Program on Non-Ferrous Subjects

Included in the program of the Non-Ferrous Division will be a round-table meeting, the annual social dinner, and two technical meetings. Speakers at the round-table meeting will discuss causes of porosity in non-ferrous castings. Papers scheduled for the technical sessions will deal with non-ferrous castings for aircraft, plaster molds, heat treating magnesium and aluminum alloys, and salvage of aluminum alloys by welding. Such a list of non-ferrous activities should attract many of the country's non-ferrous foundrymen.

B. F. Lambert, Diamond Alkali Co., Cleveland Ohio, Vice Chairman, Transportation Committee.

Awards Announced for Outstanding Contributions to Castings Industry

THE Board of Awards of the American Foundrymen's Association has announced that, at the First Western Hemisphere Foundry Congress and 46th Annual Convention of the A.F.A., to be held in Cleveland, April 20 to 24, the

J. H. Whiting Gold Medal will be presented to A. L. Boegehold, chief metallurgist, General Motors Research Laboratories, Detroit, and that the

John A. Penton Gold Medal will be presented to John E. Galvin, president, Ohio Steel Foundry Co., Lima, Ohio.

Honorary Life memberships are being conferred on Patrick Dwyer, engineering editor, *The Foundry*, Cleveland, Ohio, and on Roy M. Allen, consulting metallurgical engineer, Bloomfield, N. J.

The medal award to Mr. Boegehold is in recognition of his outstanding contributions to the field of metallurgical research in the cast iron and malleable iron industries, while the medal award to Mr. Galvin is made to him as a practical steel foundryman who has risen from the ranks and who, through his unfailing helpfulness and generosity, has contributed to the general advancement of others in the steel casting industry.

Mr. Dwyer, internationally known for his contributions through his writings on all phases of foundry practice and his creation of the character "Bill," as related in the "Adventures of Bill," a lovable tramp molder, as published for over 23 years in *The Foundry*, is being recognized for the immense good he has contributed through his writings.

Mr. Allen is being recognized for his services in conducting the first of the Association's annual convention lecture course series, the material of the course resulting in the publication of the book "The Microscope in Elementary Cast Iron Metallurgy."

The Awards Board of the Association is composed of the last seven living past presidents. The Board this year is composed of its chairman, L. N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala., with H. S. Washburn, Plainville Casting Co., Plainville, Conn.; Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; H. Bornstein, Deere & Co., Moline, Ill.; Jas. L. Wick, Jr., Falcon Bronze Co., Youngstown, Ohio; D. M. Avey, Tulsa, Okla.; and Frank J. Lanahan, Ft. Pitt Malleable Iron Co., Pittsburgh, Pennsylvania.

A. L. Boegehold

ALFRED L. BOEGEHOLD, who has been awarded the J. H. Whiting Gold Medal of the American Foundrymen's Association, will receive this award at Cleveland, when the Association will hold the First Western Hemisphere Foundry Congress, April 20-24. Mr. Boegehold is noted for his extensive and valuable research work in the field of cast iron and malleable iron and has for years been prominent in the work of the A.F.A., the American Society for Metals, the American Society for Testing Materials and the American Institute of Mining and Metallurgical Engineers. He is also a member of the Institute of Metals (British).

Mr. Boegehold, a native of Mount Vernon, N. Y., after receiving his earlier education in the schools of that city, entered Cornell University, from which he was graduated in 1915 with a degree of Mechanical Engineering. His first industrial connection was with the Remington Arms and Ammunition Co., Bridgeport, Conn., as junior engineer. During 1917, he was casting foreman for the Bridgeport Brass Co., returning to the Remington company, where he was employed as metallographer and metallurgist from 1917 to 1919. During part of 1919, he was with the Army Ordnance at Washington and the following year at Bridgeport, Conn., as metallurgist with the Remington U.M.C. Co. In 1920, he went with the General Motors Corporation as metallurgist at Dayton, O., where he remained until 1925. At

A. L. Boegehold, Chief Metallurgist, General Motors Research Laboratories, Detroit, Mich., Will Receive the J. H. Whiting Gold Medal at the 46th Annual Convention.

that time, he was transferred to the General Motors Research Laboratories at Detroit, where he is now chief metallurgist. In this capacity, he has directed numerous research projects on various phases dealing with the metal products, especially malleable iron, cast iron, steel, nonferrous parts and powder metallurgy, used in automotive production, publishing many of his results as papers before the A.F.A. and other technical societies.

John E. Galvin

JOHN E. GALVIN, president, Ohio Steel Foundry Company, Lima, O., is to be awarded the John A. Penton Gold Medal of the American Foundrymen's Association at the time of the First Western Hemisphere Foundry Congress, Cleveland, April 20-24, 1942. The award to Mr. Galvin is being made in recognition of his helpful and ready assistance to other foundrymen in cooperating in bettering steel casting production. Mr. Galvin is an outstanding example of one who has risen from the ranks to the highest executive position in the industry, for his two foundries, one at Lima and the other at Springfield, Ohio, are important units of the steel casting industry.

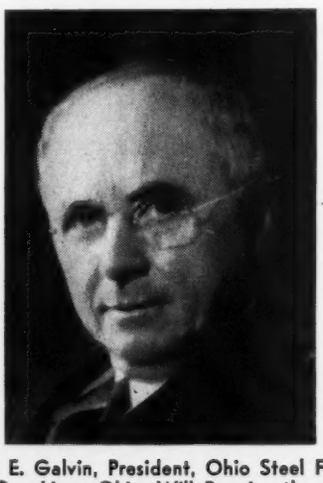
Mr. Galvin was born at Chattanooga, Tenn. After receiving his formal education at Wittenburg College, he started his industrial career with the Illinois Steel Co., South Chicago, Ill., as night foreman in the open-hearth department in 1900. In 1902 to 1904, he was with the Peru Steel Casting Co., Peru, Ind., as assistant superintendent, leaving this concern to go with the American Steel Foundries, Pittsburgh, as acting manager and with the same company as manager of the Franklin, Pa., plant, with which concern he remained until 1907. In 1907, Mr. Galvin was made vice president, Ohio Steel Foundry Company, a position he retained until 1918, when he was elevated to the presidency of the firm. Mr. Galvin, who served as a director of A.F.A. for three years, has been interested in all civic and industrial activities, serving for 10 years as director of the Federal Reserve Bank of Cleveland, as director of the Ohio Manufacturers' Association, as president of the Lima Manufacturers' Association, as National Councilor of U. S. Chamber of Commerce. He also was a delegate at large from Ohio to the National Republican Convention in Philadelphia in 1940.

In addition to his membership in the American Foundrymen's Association, he holds membership in the American Society of Mechanical Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society for Metals, the American Society for Testing Materials and the Steel Founders' Society of America.

R. M. Allen

ROY MORRIS ALLEN, consulting metallurgical engineer, Bloomfield, N. J., is to be recognized at the 1942 convention of the American Foundrymen's Association for the outstanding contribution he has made to the foundry industry through the delivery of the Association's first lecture course series on the fundamentals of the use of the microscope in gray iron foundry practice. This lecture series resulted in a most popular book on "The Microscope in Elementary Cast Iron Metallurgy," published by A.F.A.

Mr. Allen was born in Coleville, Pa., and educated in the public and high schools of Butler, Pa. He served 16 years as supervising engineer in the engineering department of Bell System, now known as the Bell Telephone Laboratory. He has since served 17 years as consulting metallurgical engineer, several of these years being spent with American Car & Foundry Company as research metallurgist. He is the originator of a large number of inventions of which many, mechanical and electrical, are assigned to the Western Electric Co. These include several on submarine detection apparatus developed during World War 1. A licensed professional engineer of New York State, he is a member of the American Institute of Mining and Metallurgical Engineers and the American Society for Testing Materials, as well as of the A.F.A. He has served as a member of the A.F.A. Committee on Cast Iron, the A.S.T.M. Committee A-3 on Cast Iron and as chairman of Subcommittee VII of Committee A-3. With a wide reputation as a microscopist, he also is a member of the New York Academy of Sciences, American Microscopical Society, Biological Photographic Association and the New York Mineralogical Club.



John E. Galvin, President, Ohio Steel Foundry Co., Lima, Ohio, Will Receive the John A. Penton Gold Medal at the 46th Annual Convention.

R. M. Allen, Consulting Metallurgical Engineer, Bloomfield, N. J., Will Receive an Honorary Life Membership in A.F.A. at the 46th Annual Convention.

Patrick Dwyer

PATRICK DWYER, for the past 23 years engineering editor, *The Foundry*, whose name and works are known in every country in the world where foundry work is practiced, was born in Ireland, August 5, 1875. At the age of 10, he arrived in Nova Scotia and six years later began his foundry apprenticeship at the plant of I. Matheson & Co., New Glasgow. At the conclusion of his apprenticeship, he took a post graduate traveling course of five years through prominent foundries in Canada and the United States to round out his knowledge of foundry practice. Returning to Nova Scotia, he served as foreman of the iron, brass and steel foundries of the Dominion Iron & Steel Co., Sydney, for nine years, and

Patrick Dwyer, The Foundry, Cleveland, Ohio, Will Receive an Honorary Life Membership in A.F.A. at the 46th Annual Convention.

later as superintendent of the Sydney Foundry & Machine Works, for a like period.

Ever a diligent student of his chosen vocation, he studied mechanical drawing at night school while an apprentice. In later years he availed himself of the foundry course of the International Correspondence Schools, Scranton, Pa., and the correspondence course developed by David McLain, Milwaukee. His extended practical experience, coupled with wide reading, a gifted taste and a remarkable memory, conferred authority, culture and polish readily apparent in his writings. His scholarly and lyrical prose delineation of the "Adventures of Bill," extending over a period of 23 years, illuminated by flashes of wit, humor, philosophy, sustained reader interest and occasional biting criticism of stuffed shirts and other examples of hypocrisy, has set a record never even remotely approached by any technical magazine. In addition to this, and a long list of technical articles dealing with practically every phase of foundry practice, he is the author of "Gates and Risers for Castings," a detailed and comprehensive treatise on this important subject. Equally gifted as a speaker and writer, Mr. Dwyer has delivered addresses before every foundry group from the Atlantic to the Pacific.

Attention! Error in the 1941 Transactions

ON page 636 of the March, 1942, issue of *Transactions* and on the same page in the *Bound Volume Transactions*, appears the following statement beginning on the sixth line: "A motion was passed unanimously to recommend to the Executive Committee of the Foundry Sand Research Committee that the 1⅛x2-in. specimen be approved as tentative standard for the elevated temperature testing of foundry molding materials."

At the time the foreword to the progress report on the investigation of effect of high temperatures on steel sands was written, the above statement was correct. However, later action by the Executive Committee changed the motion. To bring this recommendation up-to-date, the following statement should be added to the above paragraph: "By letter ballot, the Executive Committee of the Foundry Sand Research Committee voted approval of the 1⅛x2-in. specimen for elevated temperature testing of foundry molding sands, etc."

The 1⅛x2-in. specimen has not as yet been voted a tentative standard by the Executive Committee of the Foundry Sand Research Committee.

Hamilton's Uncle Sam to the Happy Working Man

ON December 24, 1941, The Hamilton Foundry & Machine Co., Hamilton, Ohio, treated their employees to the company's annual Christmas festivities. Peter E. Rentschler, company president, said that 483 employees lined up and received Defense Savings Bonds or Defense Savings Stamps, in proportion to their length of service with the company, and in addition, the usual Christmas baskets filled with candy and food. The distribution of the baskets, bonds and stamps was done by Donald McDaniel, company vice president; George A. Zettler, postmaster, Hamilton, Ohio; Peter Rentschler, company president; and Norman C. Steiger, assistant postmaster, Hamilton, Ohio. Pictures below relate the employees' enthusiasm more than words can describe.

New Committee Members

Gray Iron Division — Alloy Cast Irons Book Revision Committee—Subcommittee on Specific Applications.

W. H. Rother, Met., Buffalo Foundry and Machine Co., 1543 Fillmore Ave., Buffalo, N. Y.

Gray Iron Division—Committee on Handbook Revision.

C. O. Burgess, Met. Engr., Union Carbide & Carbon Research Labs., Inc., 4625 Royal Ave., Niagara Falls, New York.

Program and Papers — Job Evaluation and Time Study Committee.

C. E. Rowe, Industrial Engr., MacDonald Bros., Inc., Chicago, Ill.

Foundry Sand Research Committee—Executive Committee.

J. B. Caine, Met., Sawbrook Steel Castings Co., Lockland, Ohio.

The Hamilton Foundry & Machine Co., Hamilton, Ohio, gave their employees, in addition to the usual Christmas baskets filled with candy and food, Defense Savings Bonds and Stamps. Left—John Reuman shows his appreciation with a broad grin. Center (top)—Peter E. Rentschler, president, The Hamilton Foundry & Machine Co., (left) and Brown Young. Center (bottom)—The men who helped to distribute the bonds and baskets (left to right): Donald McDaniel, vice president, The Hamilton Foundry & Machine Co.; George A. Zettler, Postmaster, Hamilton, Ohio; Peter E. Rentschler, and Norman C. Steiger, Asst. Postmaster, Hamilton, Ohio. Right—Miss Norma Rasner looked at her Defense Stamp Album, looked at the camera, and the result is evident.

Causes and Remedies for Scabs and Buckles in Gray Iron Castings

By L. E. Everett,* Kaukauna, Wis.

This article is the fourth of a series being presented by members of the Gray Iron Division Committee on Analysis of Casting Defects. The defect discussed below concerns a group known to many foundrymen. The author presents five illustrations of defects and describes remedies and causes of scabs, buckles, rat tails, pull downs and blacking scabs. The December, 1941, January, 1942, and February, 1942, issues of American Foundryman contain articles on blows, ram off or ram away and inclusions respectively.

DEFECT No. 2, as accepted by the Committee on Classification of Casting Defects, comprises the group of related defects called variously, scabs, buckles, rat tails, pull downs, and blacking scabs. These defects are all very closely related as they result from improper hot strength, and high temperature expansion and contraction characteristics of the mold or core surface, although the prime causes that result in this condition may be varied and numerous.

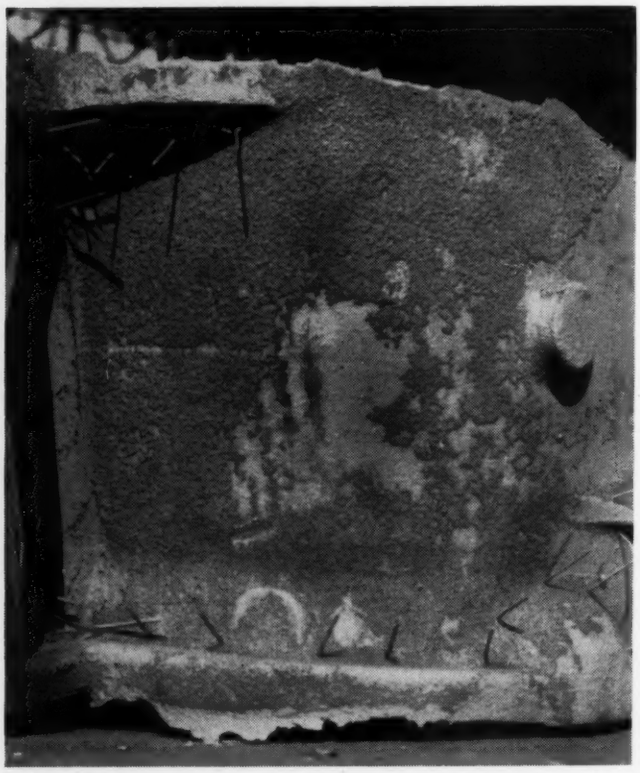


Fig. 1—Scab condition associated with a brittle bond.

Blacking Scabs

Figure 1 illustrates the scab condition frequently associated with a brittle bond, allowing the sand to spall or peel off over a fairly large area, but only to a limited depth. Some of the causes for this type of defect may be listed in the table under C 4, C 6, D 4, E 4, and E 6.

Figure 2—top—illustrates a type of scab defect that is often associated with causes listed as A 1, C 1, C 2, and C 4. The close relationship of this type of scab to a buckle can be noted.

Figure 2—bottom—illustrates a type of buckle defect. This could have been caused by conditions as stated as A 1, C 1, C 2, C 3, or C 4.

Figure 3 illustrates a rat tail, which generally results from the same causes as the defect shown in Fig. 2—Bottom, but the defect is evidenced to a lessened degree.

Figure 4 is included to illustrate a type of scab defect that frequently may result from H 2 in addition to other causes.

When molding sand or core sand is exposed to the heat of molten metal an expansion of the silica grain occurs. If the structure of the mold face is too rigid with high expansion characteristics it will be subjected to high pressures which may cause it to break, spall, flake off, or expand into the metal, causing one of the defects enumerated above. In general, any condition that promotes too high a rigidity of the surface will tend to promote these defects. It has been successfully demonstrated that a rat tail, buckle and scab can be produced at will on the same casting by varia-

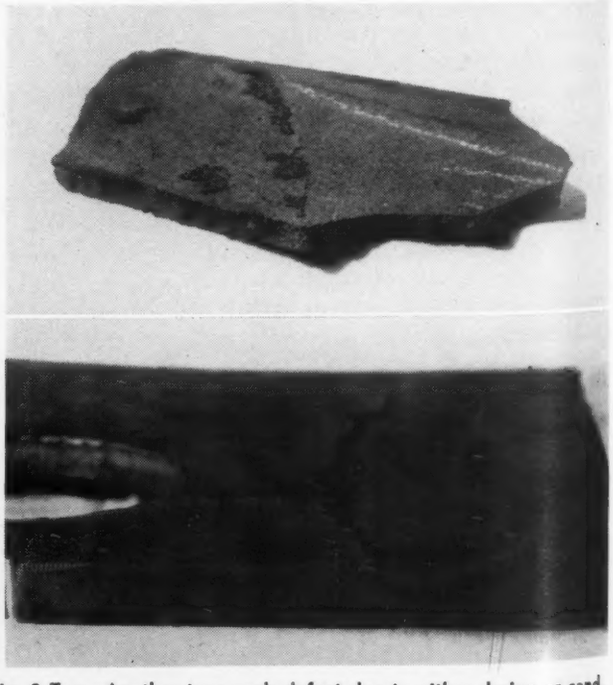


Fig. 2 Top—Another type scab defect due to either design or sand. Bottom—A buckle defect.

*Foundry Superintendent, Kaukauna Machine Corp., and member, Gray Iron Division Committee on Analysis of Casting Defects.

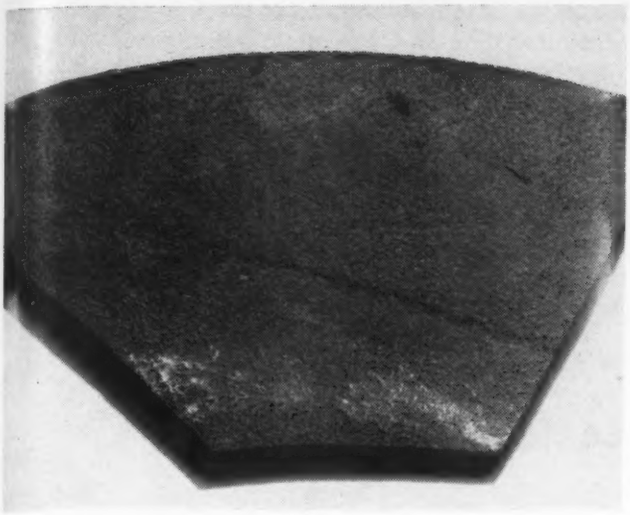


Fig. 3—A rat tail due to design or faulty sand.

tion in ramming technique if the sand characteristics are critical. Aside from ramming, which is one very important way to control the mold surface rigidity, the factors which are generally of prime importance in promoting these defects are as follows:

1. Lack of void space between sand grains which most commonly may be a result of causes C 1, C 2, C 2 (a), C 2 (b), D 5, E 1, etc. These obviously would call for correction of the basic grain structure of the sand, i.e., fineness or distribution, and the factors influencing flowability, and stability, foremost of which is moisture.

2. Insufficient combustible or organic matter in the sand which, if present, would burn out and thus develop a cushioning effect. The addition of seacoal, pitch, cereal binders, rosin, sawdust, etc., would normally be the immediate step to overcome this condition.

3. The use of bonding materials that are too weak or too brittle at molten metal temperatures, such as indicated by C 4, or D 4, or any other factor that would result in a lack of essential resiliency in the mold or core surface to permit it to withstand the heat shock incident to pouring. To correct these conditions, a more refractory bond, higher hot strength, higher hot deformation, lower high temperature expansion and contraction characteristics, and possibly higher fusion point sands are indicated.

4. The use of too strong or too hard a mold or core coating, that would cause it to "shell" off the softer, weaker, more resilient sand structure. These conditions are indicated by causes D 5, D 6, E 4, and E 5, and are generally corrected by using a "softer" wash.

While these four factors may summarily be the basic causes of all defects of the type under discussion, the controlling factor may be any of the causes listed in the accompanying table.

No. 2. Scabs, Buckles, Rat Tails, Pull Downs

Definitions:

Scabs—Scabs appear as a rough spot on the surface of a casting where the sand from the mold surface, due to expansion, has been forced into the metal and held there while the casting solidified.

Buckles—Buckles arise from the same causes as a scab, but appear as an irregular indentation with length but with comparatively little width.

Rat Tails—Rat tails are usually minor buckles occurring as a small irregular line or lines.

Pull Downs—Pull downs usually resemble a scab but occur on cope only.

Blacking Scabs—Blacking scabs are formed by the blacking flaking off and being retained in the metal.

Causes:

A. *Due to Design*
   1. Large flat surfaces
B. *Due to Pattern, Flask Equipment, and Rigging*
   1. Flask bars too close to surface of mold cavity
   2. Insufficient bars in flask
C. *Due to Sand*
   1. Too high moisture
   2. Too low permeability
      a. Too high in fines
      b. Too low grain fineness and/or poor distribution
   3. Too high or low in carbonaceous material
   4. Too low hot strength
   5. Too high green strength
   6. High permeability in facing with lower permeability in backing sand
   7. Change in type of clay without proper adjustment
   8. Improper conditioning of sand causing segregated clay balls
D. *Due to Cores* (scabs seldom occur on uncoated oil sand cores)
   1. Insufficiently baked cores
   2. Excessive moisture in or on core
   3. Permeability of core too low
   4. Amounts and type of binding material not producing sufficient hot strength
   5. Too high binder content in core wash mixture
   6. Too heavy coating of core wash
E. *Due to Molding Practice, Gating and Risering*
   1. Hard ramming
   2. Improper venting due to vent wire too close to pattern
   3. Method of preparing and setting gaggers
      a. Gaggers too low
      b. Too much clay wash
   4. Too high binder content in mold spray

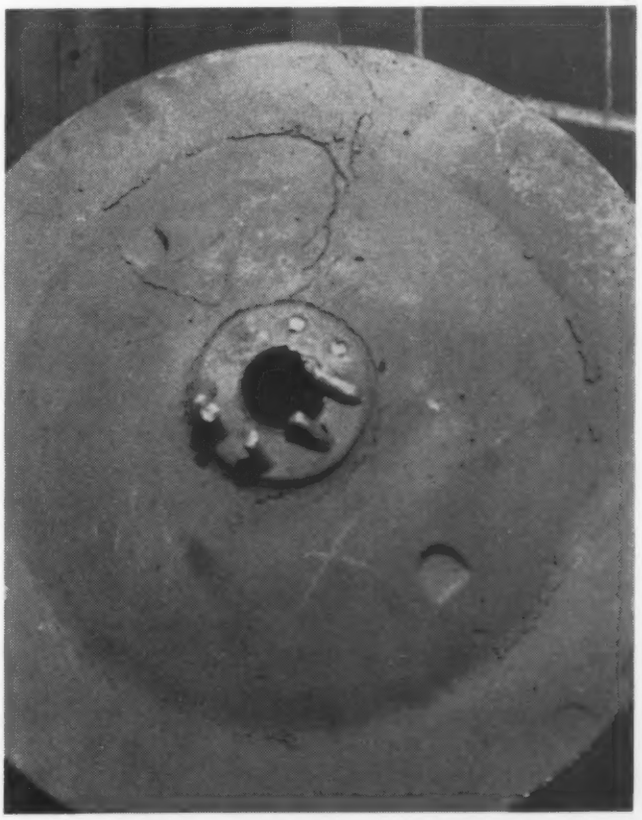


Fig. 4—A scab defect due to slow pouring.

5. Too thick blacking on mold surface
6. Mold not properly dried (dry sand or skin dried mold)
7. Improper gating

F. *Due to Iron Composition*—None
G. *Due to Cupola Operation*—None
H. *Due to Pouring*
1. Excessive pouring temperature
2. Slow pouring

I. *Miscellaneous*—None

While the foregoing represents the consensus of the committee at this time, criticism and comment are cordially welcomed so that the final tabulation will be of the greatest possible benefit to all foundrymen. These lists of defects and probable causes are being published by the committee and the A.F.A. in the hope that they will be made available directly to the "men in the shop" who will thus become more aware of the importance of the individual factors that might result in defective castings and be better enabled to reduce or eliminate them.

Plan Study of Risering and Gating for Lectures

WITH the 1942 convention completing the annual lecture course series on "Core Practices and Theories," and the publication of an extensive book containing the material contributed to that lecture by Harry W. Dietert, the Association is organizing an extensive committee under the chairmanship of W. G. Reichert, American Brake Shoe & Foundry Co., Mahwah, N. J., to get together and sponsor the collection of material on "Theories and Practices in Gating and Risering." This committee has tremendous possibilities in its work which is expected to result in the publication of another much needed foundry book covering fundamental data showing the application of theory to practice in gating and risering. Mr. Reichert has gathered together an outstanding group of committee workers in subcommittees representing the various casting branches as follows:

Automotive—Gray Iron Castings

Chairman, W. G. Mixer, Buick Div., General Motors Corp., Pontiac, Mich.

W. E. Day, Jr., Mack Mfg. Co., New Brunswick, N. J.

W. B. McFerrin, Cadillac Motor Car Div., General Motors Corp., Detroit, Mich.

L. C. Thumfors, Caterpillar Tractor Co., Peoria, Ill.

Jobbing—Gray Iron Castings

Chairman, T. J. Wood, American Brake Shoe & Casting Div., American Brake Shoe & Foundry Co., Mahwah, N. J.

A. N. Herrmann, Brillion Iron Works, Inc., Brillion, Wis.

W. Levi, Lynchburg Foundry Co., Radford, Va.

L. M. Sherwin, Brown & Sharpe Mfg. Co., Providence, R. I.

Malleable Iron Castings

Chairman, J. H. Lansing, Malleable Founders' Society, Cleveland, Ohio.

R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis.

F. Reeves, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich.

Carbon Steel Castings

Chairman, C. W. Briggs, Steel Founders' Society of America, Cleveland, Ohio.

H. L. Charlson, American Steel Foundries, East Chicago, Ind.

Anton Johnson, Oklahoma Steel Castings Co., Tulsa, Okla.

F. A. Melmoth, Detroit Steel Casting Co., Detroit, Mich.

H. F. Taylor, Naval Research Lab., Washington, D. C.

Alloy Steel Castings

Chairman, F. B. Riggan, Key Co., East St. Louis, Ill.

R. H. Frank, Bonney-Floyd Co., Columbus, Ohio.

A. S. Wright, Hunt-Spiller Mfg. Corp., Boston, Mass.

Brass and Bronze Castings

Chairman, A. K. Higgins, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

A. E. Cartwright, Robert Mitchell Co., Ltd., Montreal, Que., Canada.

W. B. George, R. Lavin & Sons, Chicago, Ill.

Aluminum and Magnesium Castings

Chairman, H. G. Lamker, Wright Aeronautical Corp., Paterson, New Jersey.

Fred Carl, Delco-Remy Div., Aluminum Foundry, General Motors Corp., Anderson, Ind.

H. J. Rowe, Aluminum Co. of America, Cleveland, Ohio.

Robert Ward, Eclipse Aviation Div., Bendix Aviation Corp., Bendix, N. J.

Nomenclature Committee

Chairman, H. F. Taylor, Naval Research Lab., Washington, D. C.

C. W. Briggs, Steel Founders' Society of America, Cleveland, Ohio.

A. K. Higgins, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

H. G. Lamker, Wright Aeronautical Corp., Paterson, N. J.

J. H. Lansing, Malleable Founders' Society, Cleveland, Ohio.

W. G. Mixer, Buick Div., General Motors Corp., Pontiac, Michigan.

F. B. Riggan, Key Co., East St. Louis, Ill.

T. J. Wood, American Brake Shoe & Castings Div., American Brake Shoe & Foundry Co., Mahwah, N. J.

Tentative plans for each subcommittee to follow show that they will cover their subjects under the following headings, with each bearing on risering and gating:

a. Review and classification of literature
b. Principles of casting design
c. Rigging practice
d. Metal characteristics
e. Production control
f. Casting defects and corrections

The material as collected and co-ordinated will be presented in lecture course sessions of the 1943 and 1944 conventions.

Random Comments

"Keep 'em Rolling"

ANYONE who thinks that the foundry industry is not doing its share in the Nation's war production program has another think coming. Member after member has visited the National office and has told how the capacity of his plant is being strained by production demands and citing that expansion is necessary to keep up with the demand. Whether or not expansions will prove a boomerang in the years to come is a moot question. The point is that we need the production now. We will have to take care of the over-expansion problem as it arises. Planning is necessary. But the tide is toward expansion.

A point we should all keep in mind is that in many instances increased production can be obtained without additional equipment—an important point in view of the difficulty of securing it. In some instances, the outlay of brains to accomplish increased production by proper utilization of facilities now available would not be very much; in others, considerable. Brain sweat, as much as body sweat, will win this war.

Rearrangement of shop facilities to provide better use of floor space often can increase production with little or no additional equipment. Typical of what may be accomplished by this method, and with minimum new equipment, are the experiences of a Detroit steel foundry and a Hamilton, Ohio, gray iron foundry. We quote from a letter received from an executive of the former:

> "We have added this year 60 per cent to the nominal capacity of this shop, and that, with very little increased equipment, which is hard to get. When it is considered that our product is under Government inspection very largely, and in our case is affected by as many as 23 separate specifications, a change from 800 tons maximum to an achieved figure of 1250 tons per month has meant a great strain on everyone concerned."

An executive of the Ohio foundry writes:

> "With a plant that was equipped to make 3600 tons of light and medium castings in 1939, we were able to produce 5300 tons in 1940, and by some engineering changes, increased personnel, longer working hours, changes and additions to equipment, and teamwork, we are striving to wind up this year of 1941 with shipments totaling 10,000 tons."

This company shipped 10,163 tons in 1941, an increase which almost trebled its 1939 production.

Need more be said of the foundry industry's participation in the war effort? Or about the utilization of facilities to increase production?

"Well Done"

TODAY a dark blue flag with a diamond-shaped area of red at its center on which is mounted the Ordnance insignia of the United States Navy flies above a second flag, a pennant, on which is shown a large "E," at the top of the flag-staff of at least three plants of our industry, the Sandusky Foundry & Machine Co., Sandusky, Ohio, and the Granite City and Indiana Harbor plants of the American Steel Foundries. These flags are a coveted symbol of efficiency, excellence and achievement. They represent the Navy's way of saying to a company, "well done!" and are known as the Navy "E." In addition, every employee of each company now wears a lapel button bearing the Navy insignia in recognition of the part he has played in making the award possible. The insignia has been awarded to some 44 companies for their contributions to the National Defense and War Programs.

It is fitting that a foundry be one of the first companies to be honored with the Navy "E." The Navy Ordnance Department insignia consists of crossed Naval guns of the Civil War era over an upright anchor—all over a circular band of blue on which is mounted the words ""United States Navy," the two words "United" and "States" at the left and right, respectively, of the crossed guns and the word "Navy" at the bottom between the crossed guns and under the anchor on a field of red. The insignia itself might be taken as an honor to the castings industry. During the Civil War, Naval guns were cast, many by the so-called "cannon makers" of New England who earned an enviable reputation in that class of work. Of course, anchors and anchor parts have been castings for many years. So it might be said that the Navy Ordnance Department insignia is a tribute to the castings industry.

When the news arrived that the Sandusky Foundry & Machine Company, the first castings manufacturer to win the Navy "E," had received this coveted award, we wondered if any other foundry companies had been so honored. So far as we have been able to ascertain from the Navy department, these three companies are the only ones of the 44 companies which have received the award whose product is castings exclusively.

However, 15 of those companies operate foundries as a part of their operations.

Our congratulations to the Sandusky Foundry & Machine Co., Sandusky, Ohio, and to the Granite City and Indiana Harbor plants of the American Steel Foundries and their employees. May they be the first of many members of the castings industry to qualify for a resounding "Well Done!" from our Government.

Castings Get a Break

RECEIVED a news release from our friend, Harry Smith, The Selas Co., Philadelphia, about the huge, new, gas-fired furnaces his company will install at one of the large steel foundries of the country for heat treating tank castings and cast armor plate. He winds up his news item with the following statement: "Over and above the needs of tank production, it is claimed the partnership of new cast alloys with more uniform and accurate heat treatment will permit, in the future, considerable part elimination, design simplification and longer life of heavy metal products."

Nice boost for castings, don't you think?

Western Michigan Maintains Lead in Chapter Contest

WESTERN MICHIGAN CHAPTER, which took the lead in the chapter membership contest in December, is tenaciously maintaining first place. The new Toledo chapter, which jumped into second place last month through the excellent efforts of its chapter membership committee, has maintained its place. That tough competitor, Wisconsin, which just will not be downed, jumped from fourth to third place. From the table, it will be noted that the Wisconsin chapter thus far has secured the largest number of members, with Chicago second and Western Michigan and Cincinnati District tied for third in number of members secured. On the opposite page is shown the new members obtained by the various chapters during the past month. Wisconsin chapter again leads the parade with 18 new members with Cincinnati District and Northeastern Ohio tied for second place with 12 each. We are happy to welcome into the leaders in the chapter membership effort the Detroit chapter which is in third place this month in the number of members secured with 11.

In reviewing the membership efforts of the 22 chapters, it is interesting to note that 21 have reported new members this month. In all, the total number of new members reported is 132 plus three conversions from Personal to Company memberships. This is the largest number of members reported for one month since the chapter membership contest started. May we offer our congratulations to the Chapter Membership Committees for their excellent work and for their determination to reach the goal set by the National Membership Committee of "5000 in '42."

Now let's look at the standing for this month. The fact that Western Michigan, Toledo and Wisconsin chapters now stand 1, 2 and 3, has received comment. Northern Illinois-Southern Wisconsin slipped a notch this month and dropped to fourth place and Chicago, which was in fifth place last month, slipped two notches to seventh. The Cincinnati District and Central Indiana chapters each advanced one step, as did Metropolitan, Michiana, Twin City, Southern California, Northeastern Ohio and Chesapeake. Detroit jumped two places and Ontario jumped three, the largest advance of any of the chapters. The Western New York, Philadelphia and St. Louis each dropped one notch, while Northern California and Quad City each dropped two notches. Central New York slipped four places but should not be discouraged. This chapter is doing an excellent job in its territory, which is large, and members must travel considerable distances to attend chapter meetings. Its meetings have been somewhat curtailed recently due to weather conditions. Chapter Membership Committees really are doing a fine job in their work. As of February 16, total membership of the Association was about 4400. This means that chapter committees must secure about 600 memberships between February 16 and April 15 to realize the goal set by the National Membership Committee of "5,000 for '42." A big job, but not an impossible one when you figure that the Association's 22 chapters need to obtain 28 new members to reach this goal. Over a two-month period this means only 14 per month. Such a plan can be worked out by the committees where this would certainly change the chapter standing list in a drastic fashion.

We again would call your attention to the section of the new members report on those outside chapter areas. It is interesting to note the interest that our South American friends in the foundry industry are taking in the activities of your Association and particularly in the forthcoming First Western Hemisphere Congress. In this list of new members reported this month, there are four who come from our Good Neighbors, two from Brazil, one from Costa Rica, and one from Mexico.

May we take this opportunity to extend a hearty welcome to all new members and say to them, "This is your Association and it is ready to serve you."

P.S.—Bundles from St. Louis. Watch the St. Louis District chapter next month. They are a mysterious group in this contest and bear watching.

Chapter Membership Progress Report

	Chapter	Membership as of 7/1/41	Chapter Quotas	Gain in Membership as of 2/14/42	Chapter Standing By Points
1	Western Michigan	50	68	30	426
2	Toledo	43	60	20	340
3	Wisconsin	310	210	92	305
4	Nor. Illinois-Sou. Wisconsin	40	46	10	278
5	Cincinnati District	141	141	30	207
6	Central Indiana	127	111	23	188
7	Chicago	425	259	54	181
8	Metropolitan	172	210	27	135
9	Michiana	67	101	18	126
10	Northern California	107	99	13	122
11	Birmingham District	242	125	17	118
12	Twin City	66	84	16	117
13	Ontario	98	199	23	114
14	Quad City	129	41	6	106
15	Western New York	151	111	13	97
16	Southern California	194	201	16	81
17	Northeastern Ohio	328	243	25	81
18	Detroit	231	196	11	67
19	Central New York	109	90	5	60
20	Philadelphia	185	237	6	46
21	Chesapeake	154	159	12	42
22	St. Louis District	135	90	2	40
		3504		469	

The above figures do not include membership in non-chapter areas.

New Members

With the membership contest moving into the closing stage it is evident from the list below that the chapter membership committees are "hitting the ball." Wisconsin leads this month's pack with 18 new members, but both the Cincinnati District chapter and Northeastern Ohio chapter gathered 12 new men. Detroit chapter hit the 11 mark while the Ontario chapter was one off with 10. The good work being done by the chapter membership committees is quite commendable and the Association compliments these committees for their fine progress. A hearty welcome also is extended to those members listed below from both your chapter and the Association.

January 16 to February 15, 1942

Conversions

Company from Personal

Central Foundry Co., Bessemer, Ala. (C. W. Nixon, Resident Manager)
R. R. Howell Co., Minneapolis, Minn. (E. Olson, Foundry Supt.)
Reliable Iron Foundry, Inc., Los Angeles, Calif. (A. H. Popperwell, Vice Pres.)

Birmingham District Chapter

W. R. Hargett, Chief Engr., Thomas Foundries, Inc., Birmingham, Ala.
B. W. Norton, Gen'l Supt., Blast Furnaces & Mines, Republic Steel Corp., Birmingham, Ala.
Paul Sullivan, Foreman, Cement Lining Dept., U. S. Pipe & Foundry Co., Bessemer, Ala.
Louis B. White, Birmingham, Ala., National Youth Administration

Canadian Section

Everett R. Turner, Chemist, Canadian Brakeshoe & Foundry Co., Ltd., Sherbrooke, Que.

Central Indiana Chapter

Gordon E. Brown, Foreman, National Malleable & Steel Castings Co., Indianapolis, Ind.
William O. McFatridge, International Harvester Co., Indianapolis, Ind.
Fred A. Osterman, Foreman, International Harvester Co., Indianapolis, Ind.
Albert H. Seymour, Cleaning & Inspection Foreman, Hoosier Iron Works, Kokomo, Ind.

Central New York Chapter

Donald H. Rishor, Rochester, N. Y., George F. Pettinos, Inc., Philadelphia, Pa.

Chesapeake Chapter

John A. Czyzewski, Prod. Clerk, Gibson & Kirk Co., Baltimore, Md.
H. M. George, Fdry. Supt., York Ice Machinery Corp., York, Pa.
James R. Kimes, Salesman, Pen Mar Company, Inc., Baltimore, Md.
Walter V. Moviltz, Gibson & Kirk Co., Baltimore, Md.
E. P. Strothman, Vice Pres. of Eng., Pangborn Corp., Hagerstown, Md.
David Tamor, Plant Met., American Chain & Cable Co., Mall. Fdry. Div., York, Pa.

Chicago Chapter

Eugene Butler, Fdry. Apprentice, Link-Belt Co., Chicago, Ill.
Anthony DeYoung, Advertising Mgr., Whiting Corporation, Harvey, Ill.
H. B. Fischer, Chicago, Ill., Salesman, Hill & Griffith Co., Cincinnati, Ohio
Edward Gricus, Fdry. Apprentice, Link-Belt Co., Chicago, Ill.
W. R. Jaeschke, Fdry. Eng., Whiting Corporation, Harvey, Ill.
Robert Loucka, Patt.-Making Apprentice, Link-Belt Co., Chicago, Ill.
Willard S. Mott, Met. Ass't., American Manganese Steel Division, Chicago Heights, Ill.
Leonard Reiter, Fdry. Apprentice, Link-Belt Co., Chicago, Ill.

Cincinnati District Chapter

Alva T. Allen, Leadman, Casting Cleaning, Wright Aeronautical Corp., Lockland, Ohio
Julian Louis Claxton, Leadman, Wright Aeronautical Corp., Lockland, Ohio
George F. Cole, Leadman, Coreroom, Wright Aeronautical Corp., Lockland, Ohio
Russell Cupito, Foreman, E. H. Bardes Range & Foundry Co., Cincinnati, Ohio
John Greenleaf, Leadman, Coreroom, Wright Aeronautical Corp., Lockland, Ohio
Clifford J. Lohbeck, Sub-Foreman, Wright Aeronautical Corp., Lockland, Ohio
Paul F. Moon, Junior Met., Wright Aeronautical Corp., Lockland, Ohio
Robert E. Moore, Sub-Foreman, Wright Aeronautical Corp., Lockland, Ohio
A. C. Schreiber, The L. Schreiber & Sons Co., Cincinnati, Ohio
Carl L. Taglauer, Ass't Met., Wright Aeronautical Corp., Lockland, Ohio
John J. Ward, Sand Lab., Wright Aeronautical Corp., Lockland, Ohio
Albert M. Wood, Supv., Wright Aeronautical Corp., Lockland, Ohio

Detroit Chapter

Wm. C. Cofell, Supt., Federal Mogul Corporation, Detroit, Mich.
Lee J. Curtin, Sales Engr., Warner R. Thompson Co., Detroit, Mich.
George P. Holman, Chemist, Detroit Steel Casting Co., Detroit, Mich.
Richard B. Hooper, Chrysler Corporation, Detroit, Michigan
Robert B. Melmoth, O. H. Melter, Detroit Steel Casting Co., Detroit, Mich.
Robert H. Mooney, Plant Engr., Saginaw Malleable Iron Division, Saginaw, Mich.
H. L. Ritts, Sales Engr., Warner R. Thompson Co., Detroit, Mich.
Edward H. Stilwill, Met., Chrysler Corporation, Detroit, Mich.
LeRoy Thrush, Sand Tech., Aluminum Co. of America, Detroit, Mich.
George A. Timmons, Met., Climax Molybdenum Co. of Michigan, Detroit, Mich.
Thomas Albert Weidig, Met., Kelsey-Hayes Wheel Co., Detroit, Mich.

Metropolitan Chapter

H. L. Bullock, New York, N. Y., Salesman, Claude B. Schneible Co., Chicago, Ill.
E. B. Cooke, President, Blacker Engineering Corp., New York, N. Y.
A. J. Derrick, Patt. Shop Foreman, American Brake Shoe & Fdry. Co., Mahwah, N. J.
J. A. Gillis, Supt., American Steel Castings Co., Newark, N. J.

Michiana Chapter

J. M. Adle, Sales Eng., American Foundry Equipment Co., Mishawaka, Ind.
K. H. Barnes, Sales Eng., American Foundry Equipment Co., Mishawaka, Ind.
V. S. Spears, Sales Eng., American Foundry Equipment Co., Mishawaka, Ind.

Northeastern Ohio Chapter

Thornton S. Carman, Treas., Edwin S. Carman, Inc., Cleveland, Ohio
R. J. Gollmar, Plant Eng., Elyria Foundry Co., Elyria, Ohio
F. S. Green, Ass't Patt. Foreman, Elyria Foundry Co., Elyria, Ohio
Edward J. R. Hudec, Demonstrator in Ind. Engineering, Case School of Applied Science, Cleveland, Ohio

*Company member.

Louis Klein, Foreman, Crucible Steel Castings Co., Cleveland, Ohio
*National Aluminum Match Plate Co., Cleveland, Ohio (A. E. Schauer, Gen'l Mgr.)
Frank Proch, Ass't Fdry. Supt., Grabler Mfg. Co., Cleveland, Ohio
Rudolph J. Schauer, National Aluminum Match Plate Co., Cleveland, Ohio
Joseph Scott, Fdry. Supt., Central Brass Co., Cleveland, Ohio
Raymond J. Staron, Moulder-Student, Chicago Pneumatic Tool Co., Franklin, Pa.
Harold Walsh, Factory Mgr., Barberton Foundry Co., Barberton, Ohio
Gordon A. Wiltse, Supt., Parker-Street Castings Co., Cleveland, Ohio

Northern California Chapter

H. D. Sherrill, Plant Mgr., Pacific Foundry Co., Ltd., San Francisco, Calif.

Ontario Chapter

W. Barton, International Malleable Iron Co., Guelph, Ont., Canada
*Callander Foundry & Mfg. Co., Ltd., Guelph, Ont., Canada (D. Callander, Fdry. Supt.)
*Eureka Planter Co., Ltd., Woodstock, Ont., Canada (A. B. Lawrason, Vice Pres.)
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Two American Steel Foundries Plants Receive the Coveted Navy "E" Pennant

THE Navy's Bureau of Ordnance flag and Navy "E" pennant are flying over two plants of the American Steel Foundries organization. On Friday, January 23, the Granite City, Ill., plant was presented their coveted prizes and one day later, Saturday, January 24, the ceremony was repeated at the Indiana Harbor plant, East Chicago, Ind.

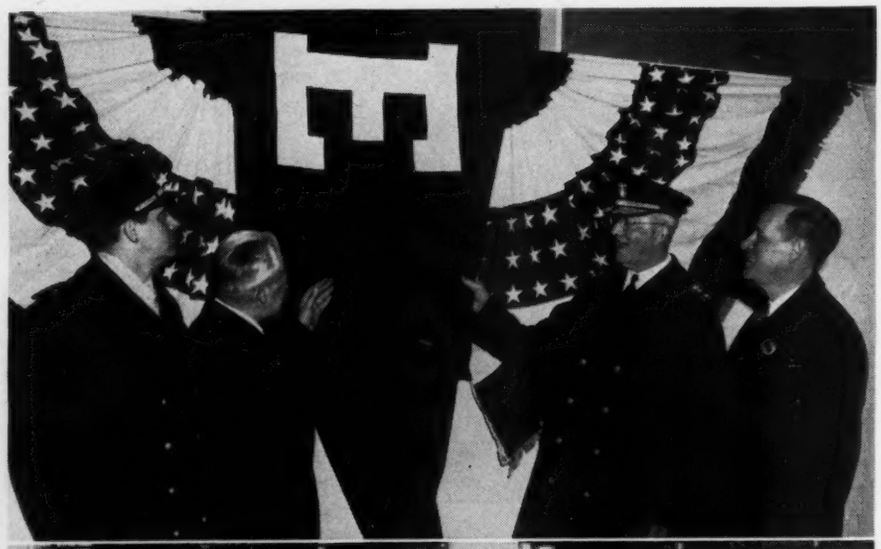
At the colorful East Chicago ceremony the flags were presented to Thomas Drever, president, American Steel Foundries, by Rear Admiral Butler, U.S.N.R., amid patriotic band music and cheers from 1600 plant employees. Rear Admiral Butler plauded the plant's high quality and speedy production of naval armament in his presentation speech.

A special ceremony was devoted to the presentation of a Navy "E" badge to O. F. Turnell by Lieut. E. K. Winn, inspection officer in charge, Chicago. Mr. Turnell has the longest service record of any employee at the Indiana Harbor plant, having been employed by the company for 47 years. John W. Porter, works manager, Indiana Harbor plant, and Chicago chapter director, then received the badges from Lieut. Winn for all the employees in the plant.

Mr. Porter acted as master of ceremonies and introduced the various speakers and executives of the American Steel Foundries who were present at the ceremony. Among those present were Past National Director A. Walcher, vice president in charge of operations, Chicago; F. B. Ernst, director and vice president in charge of sales, Chicago; C. L. Heater, vice president in charge of engineering, Chicago; C. C. Jarchow, comptroller, Chicago; Oliver E. Mount, secretary and treasurer, Chicago; Arthur Bentley, director, Chicago; C .K. Foster, director, Chicago; H. B. Hurd, director, Chicago; and E. P. Waud, director, Chicago. Besides Rear Admiral Butler and Lieut. Winn, the Navy was represented by Ensigns Goehring, Hammett and Jennings. Also on hand were various county and city officials.

The program began with music by the Great Lakes Naval Training Station band from Great Lakes, Ill. A color guard from the naval station posted the col-

John Porter (right) explaining an operation to Rear Admiral Butler while taking a tour of the Indiana Harbor plant, American Steel Foundries. In the background is Thomas Drever.



Top—Looking over the "E" are (left to right) Lieut. Winn. U.S.N.R., Thomas Drever, Rear Admiral Butler and John Porter, works manager, Indiana Harbor plant, and Chicago chapter director. Bottom—(left to right) Past National Director A. Walcher, vice president in charge of operations, American Steel Foundries, Chicago Ill.; Rear Admiral Butler and Thomas Drever, president, American Steel Foundries, Chicago, Ill.

Rear Admiral Butler, U.S.N.R., presenting the Navy "E" to Thomas Drever, president, American Steel Foundries, Chicago, Ill., at the East Chicago, Ind., ceremony.

ors, followed by the playing of the National Anthem.

The "E" pennants have been awarded in Naval circles almost from the time that the United States Navy was established. However, it is only since the present emergency was declared that this award has been extended to plants manufacturing Naval equipment.

The fact that the foundry industry is backing the armed forces of the United States is quite evident. It is more so after reviewing the list of companies who have received the Navy "E." This list of Navy "E" winners is shown in the box below and names 44 winning plants. Other foundries throughout the country are doing their share, too, though many have not received such prominent recognition. However, these companies, and their employees, take pride in their work and know that they are doing their part by producing castings that are going in a weapon or machine that will help to defeat the Axis.

A leading metallurgist says that manganese, in the amounts usually employed in plain carbon steels, does not increase fluidity at normal pouring temperatures.

Castings, either cylindrical or symetrical, can be made in a vertical centrifugal casting machine.

The Honor Roll

THE following companies have been awarded the Navy "E," the coveted symbol of efficiency, excellence and achievement awarded for conspicuous co-operation and production of material for the United States Navy. Those companies whose names are printed in italics operate foundry departments, while those printed in bold-face type produce castings as their major product:

American Locomotive Co., Schenectady, N. Y.
American Steel Foundries, Indiana Harbor Plant, East Chicago, Indiana, and Granite City, Illinois
Arma Corporation, Brooklyn, N. Y.
Bantam Bearings Corporation, South Bend, Ind.
Bausch & Lomb Optical Co., Rochester, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
Bridgeport Brass Co., Bridgeport, Conn.
Cameron Iron Works, Houston, Texas.
Carnegie-Illinois Steel Co., Homestead, Pa.
The Carrier Corporation, Syracuse, N. Y.
Consolidated Machine Tool Corp., Rochester, New York.
Continental Gin Co., Birmingham, Ala.
Crucible Steel Company of America, Harrison, N. J. (Crucible Steel Midland Plant, Midland, Pennsylvania).
E. I. DuPont de Nemours & Co., Inc., Wilmington, Del.
Eclipse Machine Div., Bendix Aviation Corp., Elmira, N. Y.
Erie Forge Co., Erie, Pa.
The Erie Works, General Electric Co., Erie, Pa.
Fisher Body Division, General Motors Corp., Detroit, Mich.
Ford Instrument Co., Long Island City, N. Y.
Goss Printing Press Co., Chicago, Ill.
Heppenstall Company, Pittsburgh, Pa.
Ingersoll Milling Machine Co., Rockford, Ill.
International Nickel Co., Huntington, W. Va.
Keuffel & Esser Co., Hoboken, N. J.
Kropp Forge Co., Chicago, Ill.
Lakeside Bridge & Steel Co., Milwaukee, Wis.
Lansdowne Steel & Iron Co., Morton, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Midvale Co., Nicetown, Philadelphia, Pa.
Miehle Printing Press & Mfg. Co., Chicago, Ill.
The Monarch Machine Tool Co., Sidney, Ohio.
National Forge & Ordnance Co., Irvine, Pa.
Norris Stamping & Mfg. Co., Los Angeles, Calif.
Northern Pump Co., Minneapolis, Minn.
Pollak Mfg. Co., Arlington, N. J.
Sandusky Foundry & Machine Co., Sandusky, Ohio
SKF Ball Bearing Company, Philadelphia, Pa.
Standard Steel Works Div., Baldwin Locomotive Works, Burnham, Pa.
Textile Machine Works, Reading, Pa.
Triumph Explosives, Inc., Elkton, Md.
Vickers, Inc., Detroit, Mich.
Westinghouse Elec. Elevator Co., Jersey City, New Jersey.

Data on Gates and Risers for Copper Tin Bronzes and Red Brasses Used Today

By W. B. George, Chicago, Ill.

The author, W. B. George, is sales metallurgist, R. Lavin & Sons, Inc., Chicago, Ill. His name is quite familiar as he has talked before many of the Association's chapters on gating and risering which have caused considerable favorable comment. The following paper was presented at a non-ferrous session of the Joint Regional Foundry Conference, Purdue University, West Lafayette, Ind., Oct. 18, 1941. There is no limit to the material which can be written about gates and risers and this paper is only meant to lay down fundamentals for a better understanding of directional solidification that is required for the making of sound castings in tin bronzes and brasses. Numerous methods of gating and risering such items as solid bars and rings are discussed. The use of pencil, choke, skim, whirl, horn and other type gates are explained. The many illustrations tend to show some of the rights and wrongs of gating and risering and their effect on the casting.

IN order to understand the technique required in the proper placing of gates and risers, it is necessary to first obtain a clear picture of just what is taking place within the casting.

The first particles of metal to solidify within the mold are in crystal form, as shown in Fig. 1 (left), which, in the progress of solidification, arrange themselves in dendritic patterns, illustrated in Fig. 1 (center). In properly fed castings these patterns are completed into grains throughout the entire mass and bound together as shown in Fig. 1 (right). When castings are improperly fed, many grains are not completed and we find porous spots within the castings. This is illustrated with Fig. 1 (center) and Fig. 4 (bottom). Should the section be of large size, it is found that this dendritic structure has collapsed, leaving a shrink hole as shown in Figs. 9 and 16.

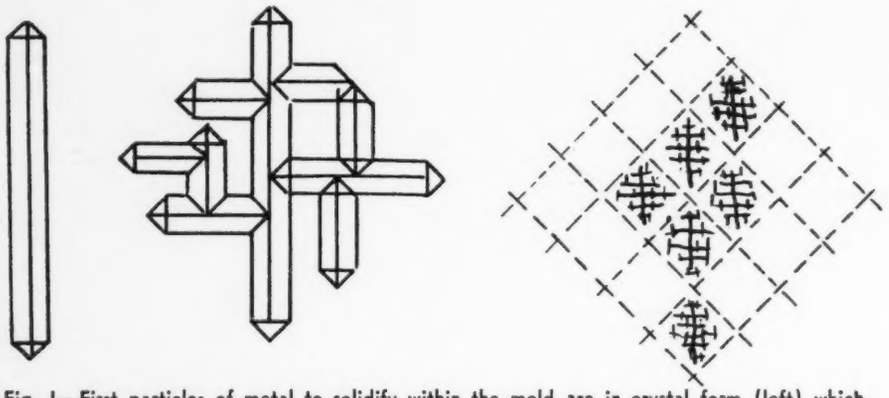


Fig. 1—First particles of metal to solidify within the mold are in crystal form (left) which, in solidification, arrange themselves in dendritic patterns (center) and these patterns are completed into grains throughout the mass and bound together (right).

In the building of a sound house, solid material must be used. It is the same in the making of a casting—it is necessary to have grain completion or dendritic structures result in some cases, and shrink holes in others, which correspond with unsound material in our building.

In order to bring about a sound grain structure throughout the entire casting, the metal must be solidified directionally from the farthest point of the mold, toward the gate or riser. This directional solidification is like laying the bricks from the foundation to the roof. Each brick or grain is fitted properly to support the following one.

These grains, when properly fed, adjust themselves to fit each other, as well as the contour of the casting.

There are two general types of grains, one being columnar and the other equal axial: Fig. 2A illustrates columnar grains; Fig. 2B illustrates equal axial; and Fig. 2C illustrates columnar and equal axial grains, both in the same casting.

As a rule, columnar grains predominate in copper-tin and red brass alloys, while equal axial grains predominate in the manganese and aluminum bronzes. This paper, however, has no bearing on manganese or aluminum bronze alloys.

The size of the grain is governed by the cooling rate. Slower cooling develops a larger grain. Since large grain sizes are not desired, it becomes necessary to pour metal as cold as possible and still feed the casting. In practice, this temperature varies from 1800° to 2300°F., depending upon the size and shape of the casting. Test bars are generally poured at 2150°F.

Fig. 5 shows directional solidification in its most ideal form. There is about 300°F. drop in temperature from the heavy to the light end in a wedge 12x¾x ⅜-in.

Fig. 6 illustrates a disc, for instance, 12-in. in diameter and one inch thick. If the top and bottom surfaces were machined and liquid or air pressure applied at the center, it would leak in most cases. Upon fracturing, there would be found a coarse

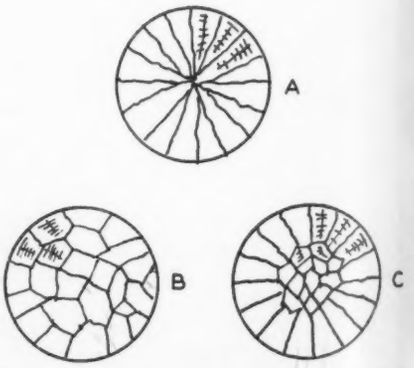


Fig. 2—General types of grains. A—Columner grains. B—Equal axial grains. C—Columnar and equal axial grains.

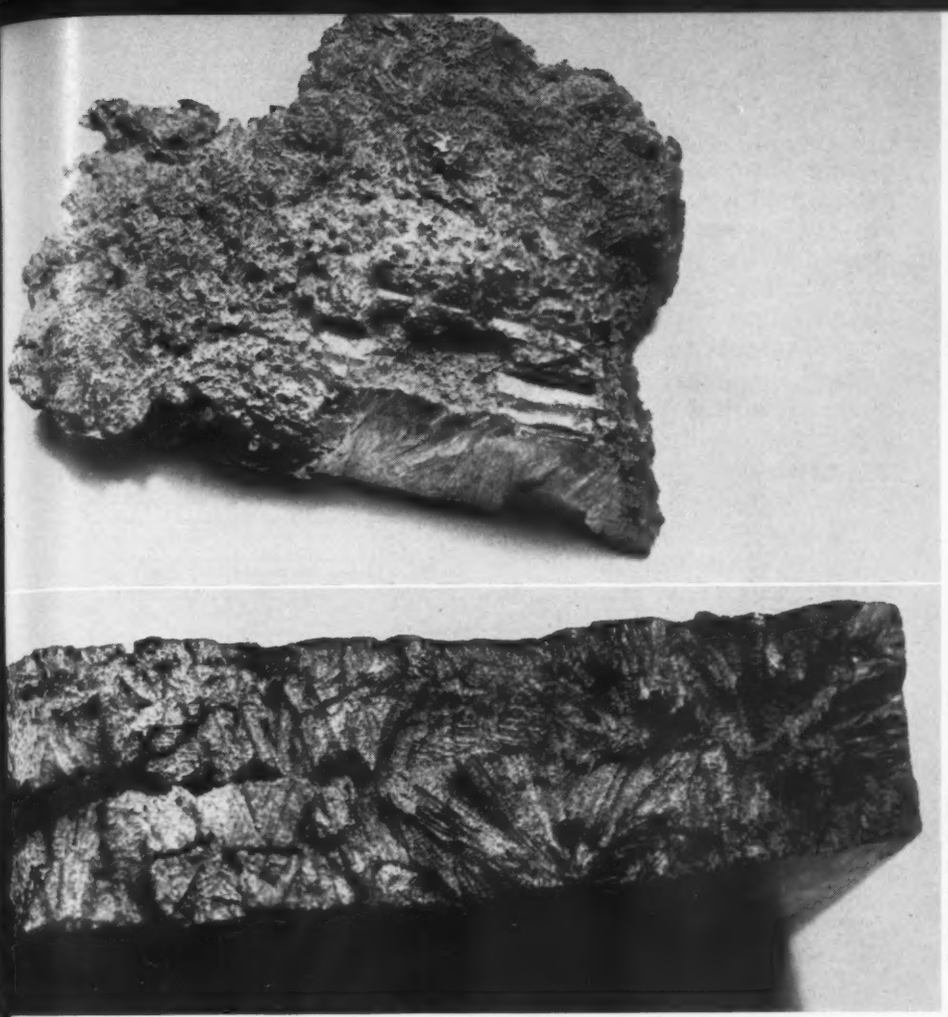


Fig. 3—(Top) Fracture showing dendritic structure due to improper feeding. Specimen is red brass and was cast as illustrated in Fig. 16 (Right). (Bottom) General arrangement of columnar grains brought out by hot fracture. Specimen is of a low grade brass.

dendritic structure at *A*, minus the necessary grain boundaries. On further examination it would be found that solidification started from the surfaces *B*, shutting off the effect of the risers. In order to obtain a sound casting of this type, solidification must start in the center, and the risers should feed toward it. This may be accomplished by the use of a chill shown as *X* in Fig. 7, or lightening of the center, as described in Fig. 8.

Fig. 4—(Top) Arrangement of equal axial grains brought out by hot fracture. Specimen is of aluminum bronze. (Bottom) Dendritic structure of the part of a pressure casting that leaked, showing incomplete grains. Material is copper-tin bronze.

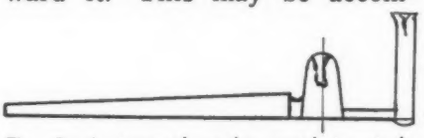


Fig. 5—A tapered wedge used to study directional solidification.

Figure 9 illustrates the use of a riser upon a boss or hub of a casting where the neck is too small. As the neck freezes before the boss or hub, the result is an internal shrink at *A*.

Figure 10 illustrates the same hub or boss with sufficient riser which will not freeze off, but which will keep up the directional flow of liquid metal until the mass of the casting has become solidified.

Figure 11 (left) shows the use of the horn gate. Figure 11 (right) illustrates a pouring box with "pencil gates."

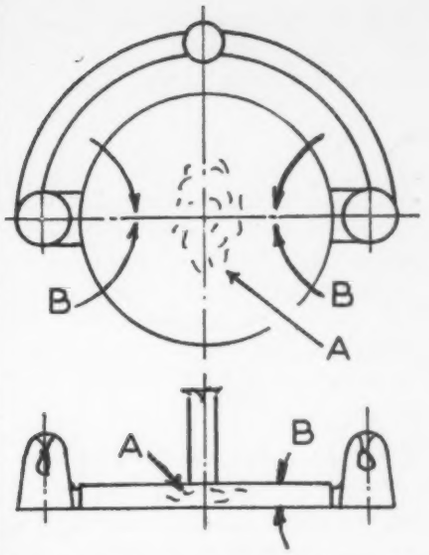


Fig. 6—Incorrect method of risering a disk 12-in. in diameter and 1-in. thick.

It should always be borne in mind that the hottest metal must exist in the riser. In order to accomplish this, it becomes necessary to either gate into the riser or fill it with hot metal after the casting is covered.

Figure 12 shows a large casting poured from the bottom with an internal shrink due to cold metal being forced to the top.

Figure 13 shows the same casting with risers too far apart, and porous spots at *B*.

Figure 14 shows design for a ring riser with side gates for this class of work.

Figure 15 illustrates an ideal method for the pouring of large

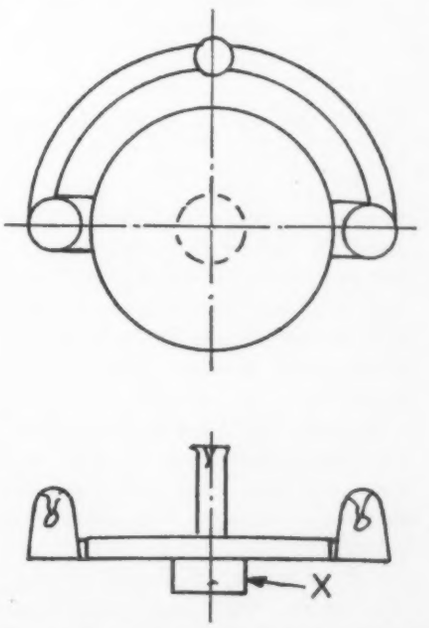


Fig. 7—A better method of risering Fig. 6 by the use of a chill shown at X.

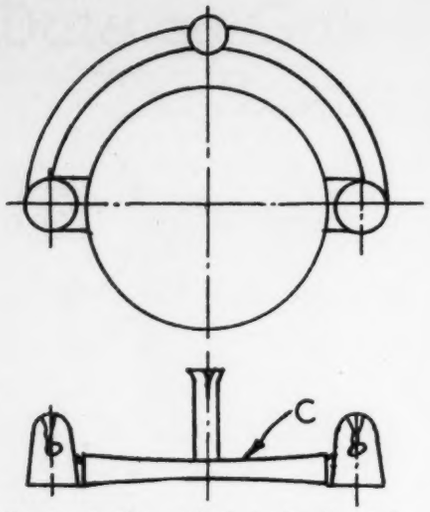


Fig. 8—Another method risering Fig. 6 by lightening of the center.

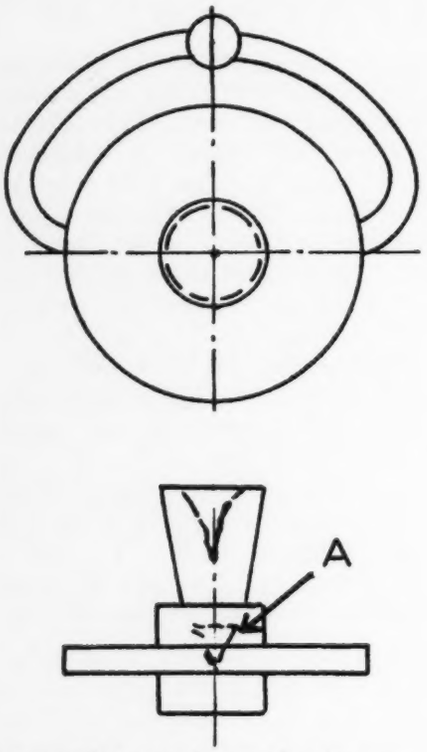


Fig. 9—Illustrating the use of a riser upon a boss or hub of a casting where the neck is too small.

castings. By this method the metal is ladled into the pouring box, which has a number of small pencil gates. These pencil gates relieve the strain, hold back the dross, and govern the rate of pour.

Figure 16 (left) illustrates bottom gating of a solid bar, say, for example, 6-in. in diameter and 16-in. long. The result is shrinkage in the side *A* and center *B*. Figure 16 (right) shows the same bar with improper riser, resulting in internal shrinkage at *A*.

Figure 17 (left) shows this casting with top riser and side gate, which is satisfactory. Figure 17 (right) shows ideal method to cast large, solid bars. The pouring box with the pencil gates can be developed to govern rate of solidification.

Many times castings are gated as shown in Fig. 18 (top). This is a poor method since the coldest metal remains in the riser. The result is a porous spot at *A*.

Figure 18 (bottom) is the preferred method since the hot metal is where it is needed.

In Fig. 19 (top) is shown the result when hot metal does not reach the riser farthest away from the gate. The defect is porosity, shown at *A*.

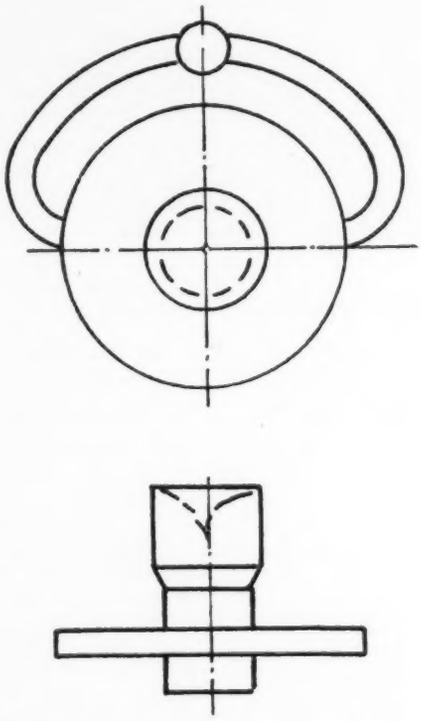


Fig. 10—The same hub or boss as in Fig. 9 with sufficient riser which will not freeze off.

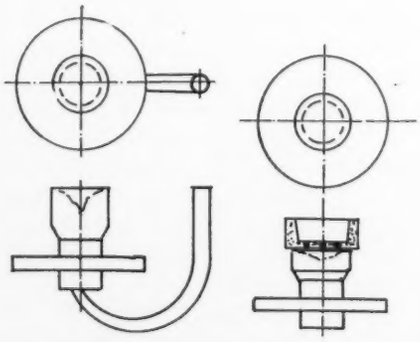


Fig. 11—(Left) Gating Fig. 9 with a horn gate. (Right) Using a pouring box with "pencil gates" on Fig. 9.

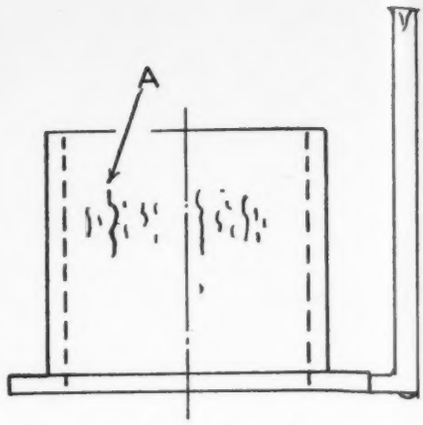


Fig. 12—A large casting bottom poured containing an internal shrink A.

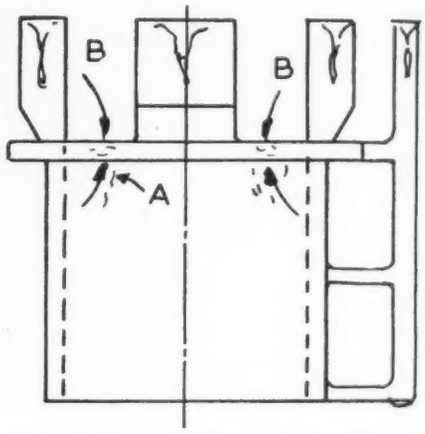


Fig. 13—Same casting as Fig. 12 with risers too far apart and causing porous spots B.

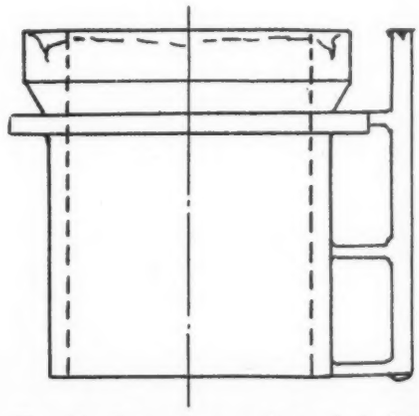


Fig. 14—The correct method of risering casting in Figs. 12 and 13, using a ring riser with side gates.

Figure 19 (bottom) shows the proper gate with hot metal going into all risers.

In making many classes of work, it often becomes necessary to gate on the thin wall of the casting. This should be followed out with consideration for the wall thickness; a little forethought here will save many castings.

Figure 20 illustrates a gate that is too large for the wall to which it is attached with the result of an internal shrink at *A*.

Figure 21 illustrates a draw *B* on the internal wall of the casting from a gate that is too small.

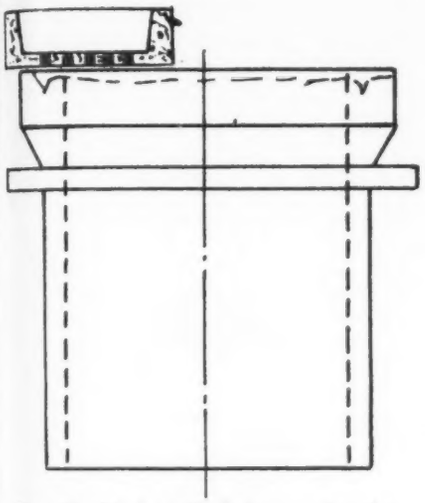


Fig. 15—Ideal method for pouring large castings.

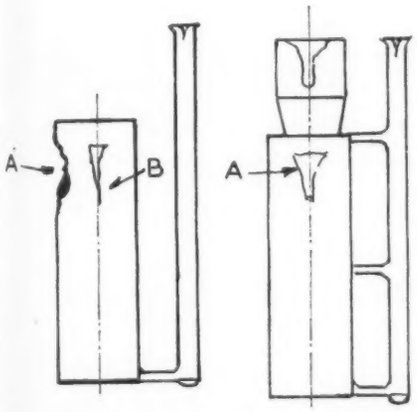


Fig. 16—(Left) Bottom gating a solid bar. Shrinkage in the side A and center B. (Right) Same bar as left with improper riser. Internal shrinkage at A.

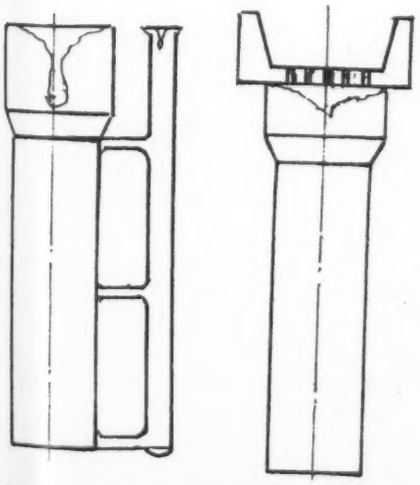


Fig. 17—(Left) Casting bar in Fig. 16 satisfactorily using top riser and side gate. (Right) Ideal method to cast large, solid bars using pouring box with pencil gates.

Figure 22 illustrates a draw on the external surface of the casting due to lack of a proper fillet.

Gates on thin wall castings must be designed so that they are a part of the casting itself and must be neither larger nor smaller than the wall to which they attach. The fillet radius between the gate and the casting should be one-half of the wall thickness.

Figure 23 illustrates the proper proportion.

In addition to feeding castings, gates can be made to perform mechanical skimming effects.

Dirt and drosses will separate from the metal wherever it changes its course of direction or drops its velocity within the mold.

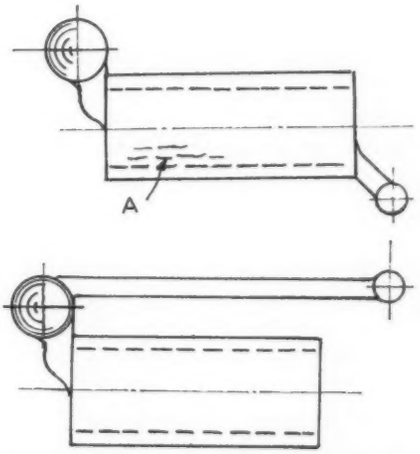


Fig. 18—(Top) A poor method of gating that will cause porous spot A. (Bottom) The proper way to gate this casting.

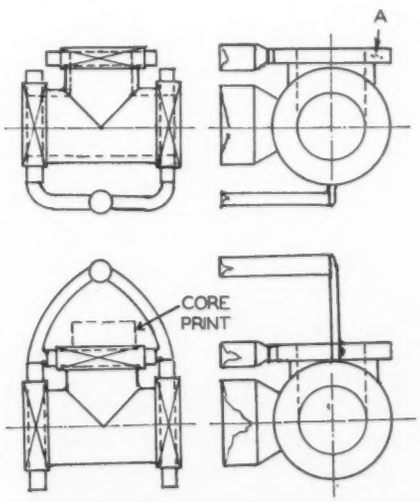


Fig. 19—(Top) When hot metal does not reach the riser farthest away from the gate porosity is caused at A. (Bottom) Proper gating method for this type casting.

Gates used to accomplish this effect are generally known as strainer, choke, skim or whirl gates.

Figure 24 (top) illustrates a pouring box with pencil gates, and is recommended for all top pouring. Figure 24 (bottom) is a choke gate used on most work to hold back dross and to keep the sprue full.

Figure 25 (left) shows a skim core, novel in design, but seldom

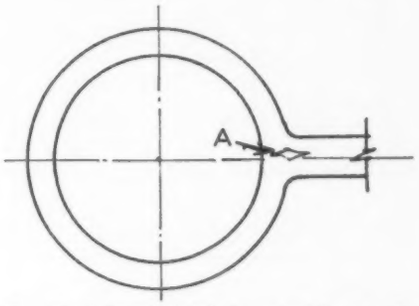


Fig. 20—Internal shrink A caused by a gate that is too large for the wall to which it is attached.

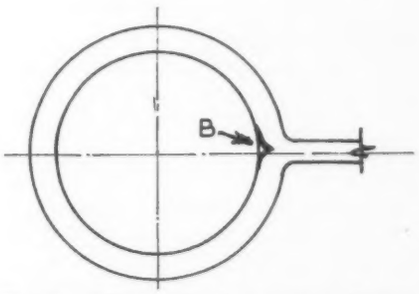


Fig. 21—Draw B caused on same casting as Fig. 20 due to a gate that is too small.

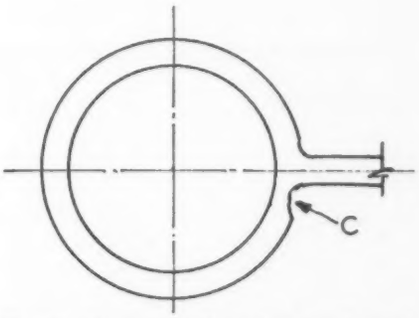


Fig. 22—Draw C on the external surface of the casting due to lack of proper fillet.

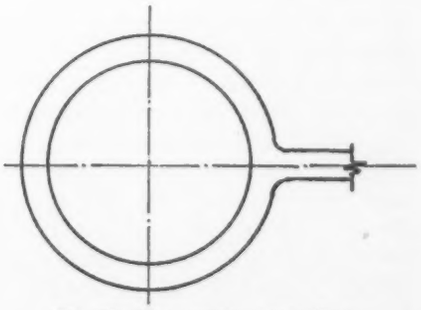


Fig. 23—The proper proportion.

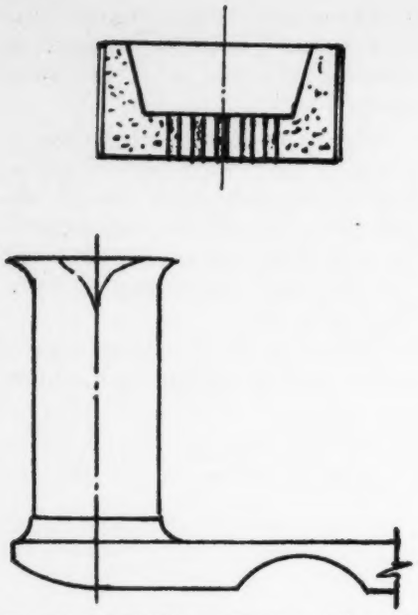


Fig. 24—(Top) The pouring box with pencil gates. (Bottom) Choke gate used to hold back dross and dirt.

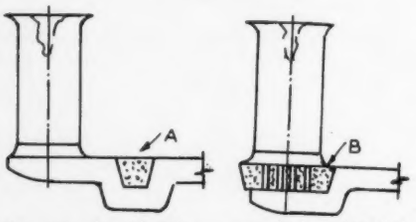


Fig. 25—(Left) Skim core (A). (Right) Strainer core (B) in the gate.

used, although efficient when utilized as a choke. Figure 25 (right) is a strainer core placed in the gate and used by many foundrymen.

Figure 26 (top) shows the whirl gate with the dross thrown out at *A*. Figure 26 (bottom)

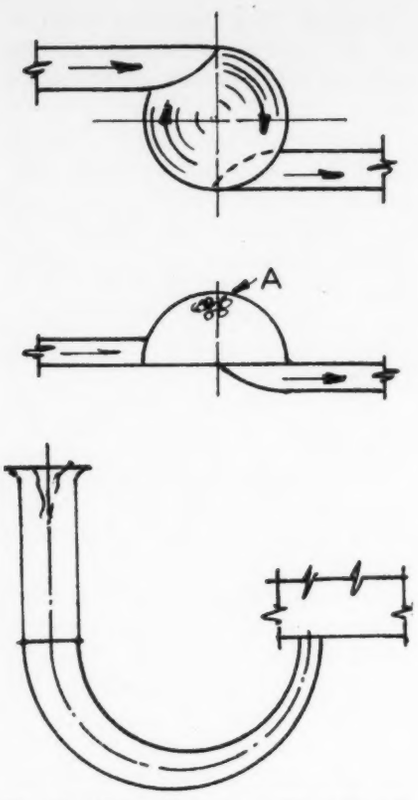


Fig. 26—(Top) Whirl gate with dross collected at A. (Bottom) A horn gate.

shows a horn gate which has many advantages on such work as gears, propellors, etc.

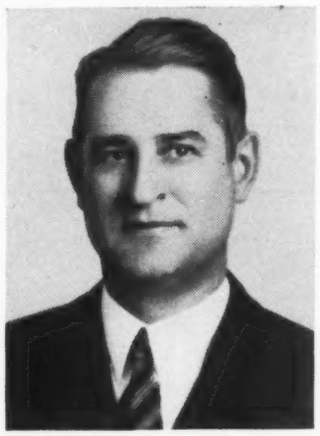
There is no limit to the material which can be written about gates and risers, and this paper is only meant to lay down the fundamentals for a better understanding of the directional solidification that is required for the making of sound castings in tin bronzes and red brasses.

Director W. J. Corbett Passes Away at Buffalo

WILLIAM J. CORBETT, member of the Association's Board of Directors and vice president and works manager, Atlas Steel Casting Co., Buffalo, N. Y., died Tuesday, February 3. He was elected as an officer of the Association last year at the 45th Annual Convention held in New York City. He had been actively interested in Association work for many years. Mr. Corbett was a past chairman and vice chairman of the Western New York chapter, had participated in A.F.A. Cost Committee work, representing the Steel Founders' Society, and had written extensively for the technical press in relation to steel castings. He also had presented papers before A.F.A. conventions and meetings of the American Iron and Steel Institute and the Society of Industrial Engineers.

Mr. Corbett was born in Kingston, Ont., Canada. When his parents moved to Erie, Pa., he attended and was graduated from Central High School. He then furthered his education by enrolling at Carnegie Institute of Technology, Pittsburgh, Pa., from which he was graduated in 1914 with an engineering degree. Later, in 1922, he received a metallurgical engineering degree.

After graduation, in 1914, he was employed by the American Steel Foundries, Alliance, Ohio, as a special apprentice. In 1915, he was tranferred to the Chester, Pa., plant and became a production engineer. Four years later, he was sent to the Chicago office to become assistant to the vice president. Mr. Corbett severed his connections with this company in 1921 to become a cost accountant with the Steel Founders' Society of America. He left that position after a year to go back to Chicago as an indus-



National Director W. J. Corbett, Atlas Steel Casting Co., Buffalo, N. Y., whose passing will be greatly felt by the industry and the Association.

trial engineer for the Electric Steel Founders Research Group; but he was back in Pittsburgh in 1925 as secretary and manager, Steel Founders' Society of America until 1928. From that year till 1933 Mr. Corbett was the assistant to the president and works manager, Fort Pitt Steel Casting Co., McKeesport, Pa. In 1933, he accepted the position he held up to his death with Atlas Steel Casting Co.

Metropolitan Publishes Subcontracting Booklet

"SUBCONTRACTING for Defense," a report published by the Metropolitan Life Insurance Co., outlines methods followed by 28 companies in meeting the problems of prime contracting or subcontracting. A copy can be secured on request by writing to: Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York City.

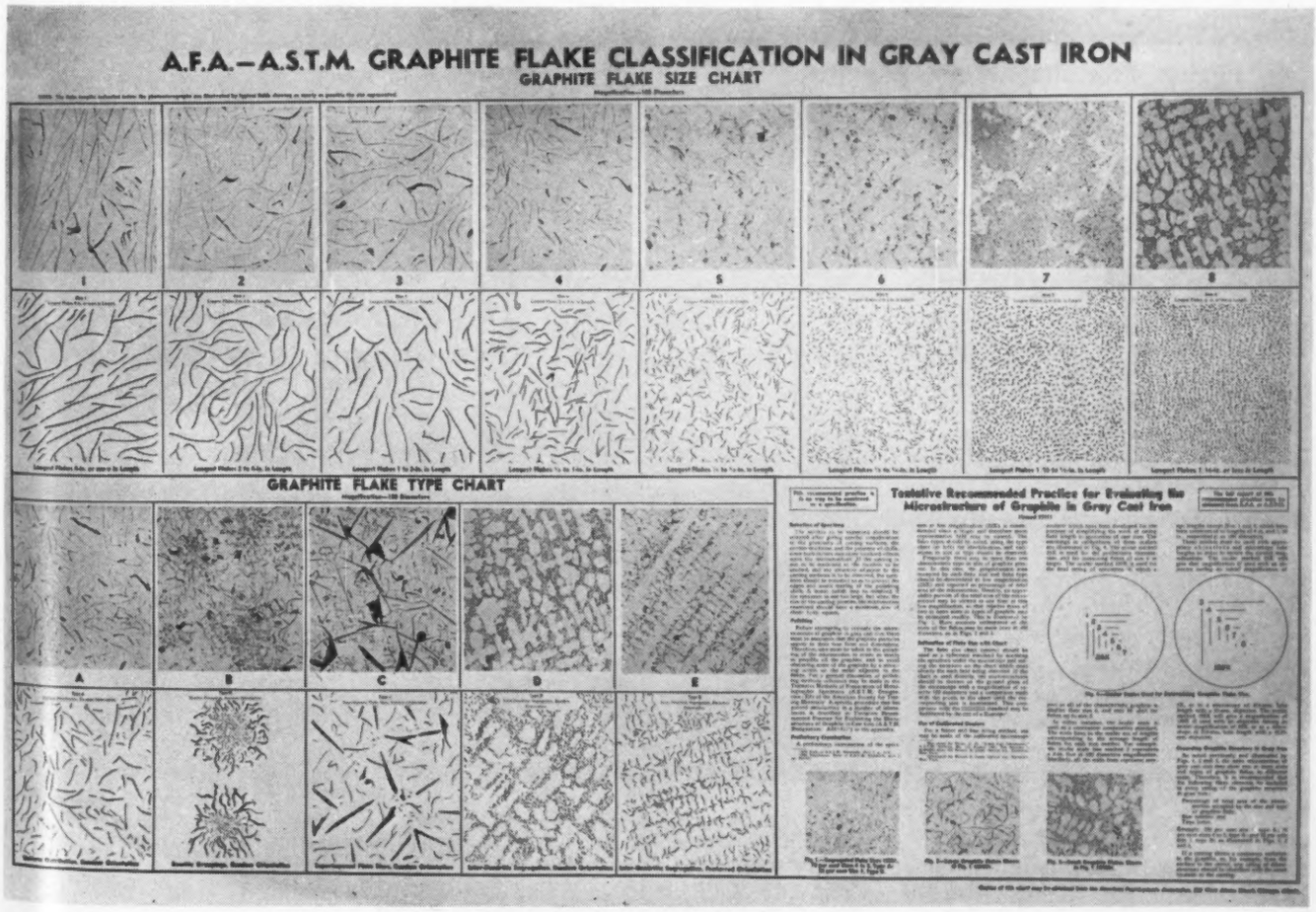
Graphite Flake Classification Charts Now Available

FOR many years, cast iron metallurgists have lacked some method of describing a graphite flake size and form. As a result, it has been somewhat difficult, because of the wide variation in methods of description, to describe properly these formations in cast iron. Interest in this matter has been evident over a period of years, as far back as 1927, when John W. Bolton, Lunkenheimer Co., Cincinnati, presented a paper before the American Foundrymen's Association entitled "Some Graphite Formations in Gray Cast Iron." Following this paper, many other discussions were held on the subject of graphite classification before not only the American Foundrymen's Association but other American and foreign technical groups, among them being a paper by W. E. Mahin and J. W. Hamilton entitled "A Proposed Standard Classification of Graphite in Gray Cast Iron" before A.S.T.M. in 1937.

This paper crystallized the desire for some standard method of classifying both form and size of graphite in gray cast iron and resulted in the formation of the American Foundrymen's Association Gray Iron Division Committee on Classification of Graphite in Gray Iron, under the chairmanship of W. E. Mahin, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., who proposed the first such classification, and who is recognized as having been chiefly responsible for the present A.F.A.-A.S.T.M. tentative recommended practice. About the same time, the American Society for Testing Materials became interested and Committee A-3 of that organization appointed Subcommittee VII on Microstructure of Cast Iron under the chairmanship of G. F. Comstock, Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

These two committees co-operated closely and collaborated in preparing and offering to the American Society for Testing Materials, which organization is recognized by the American Foundrymen's Association as the specifications making body for the castings industry, a Tentative Recommended Practice for Evaluating the Microstructure of Graphite in Gray Cast Iron. At the 1941 annual meeting of the American Society for Testing Materials, this recommended practice was passed to a tentative status and now bears the A.S.T.M. designation A 247-41T. This tentative recommended practice now provides metallurgists and foundrymen with a method for describing accurately not only the size but also the type of graphite formation in gray cast iron.

However, *it should be noted that this present tentative recommended practice is in no way*



A.F.A.-A.S.T.M. Graphite Flake Classification Chart.

New Committee Members

Committee on Cooperation with Engineering Schools

A. C. Davis, Prof. Dept. of Experimental Engrg., Cornell University, Ithaca, N. Y.

C. J. Freund, Dean, College of Engrg., University of Detroit, Detroit, Mich.

S. D. Moxley, American Cast Iron Pipe Co., Birmingham, Ala.

J. F. Oesterle, Prof., Met. Engrg., University of Wisconsin, Madison, Wis.

Steel Division Committee on Methods of Producing Steel for Castings

Charles Locke, Met., West Michigan Steel Foundry Co., Muskegon, Mich.

Cast Metals Handbook Revision Steering Committee—Non-Ferrous Division

Chairman—H. M. St. John, Supt., Dept. No. 5, Crane Co., 4100 S. Kedzie Ave., Chicago.

C. V. Nass, Asst. Supt. of Fdries., Fairbanks, Morse & Co., Beloit, Wis.

Wm. Romanoff, Vice Pres., H. Kramer & Co., 2119 S. Loomis St., Chicago.

to be construed as a specification, but is to be used merely as a standard method for describing the occurrence of graphite in the microstructure of cast iron.

Realizing the value of this practice, the American Foundrymen's Association has prepared a wall size chart of the A.F.A.-A.S.T.M. Graphite Flake Classification in Gray Cast Iron. This chart contains not only reproductions of typical fields showing the eight graphite flake sizes contained in the practice, but also the five types of graphite. In addition, it contains directions for the selection of specimens, polishing, preliminary examination, estimation of flake size, use of calibrated oculars in determining flake size, and proper method of recording gray iron graphite structure data.

The photomicrographs used as illustrations were prepared by J. A. Ferree, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and A. Boyles, Battelle Memorial Institute, Columbus, Ohio. John W. Bolton, Lunkenheimer Co., Cincinnati, assisted by A. J. Smith of the same company, prepared the drawings.

This chart is now available from the American Foundrymen's Association, 222 W. Adams St., Chicago, for $1.00 to members and $2.00 to non-members.

Burgess Succeeds Smith on Gray Iron Committee

E. K. SMITH, formerly associated with the Electro Metallurgical Co., in its Detroit office, who has been serving as chairman of the Gray Iron Division Handbook Revision Committee, has resigned as chairman of the committee and has severed his relations with the Electro Metallurgical Co. Mr. Smith has accepted an appointment as Senior Metallurgist (civilian) Army Ordnance Dept., Industrial Service, Tank and Armored Vehicle Div., Washington, D. C.

C. O. Burgess, Metallurgical Engineer, Union Carbide & Carbon Research Labs., Inc., Niagara Falls, N. Y., has been appointed chairman of the committee in Mr. Smith's place.

I.B.F. and A.F.A. to Have Exchange Papers

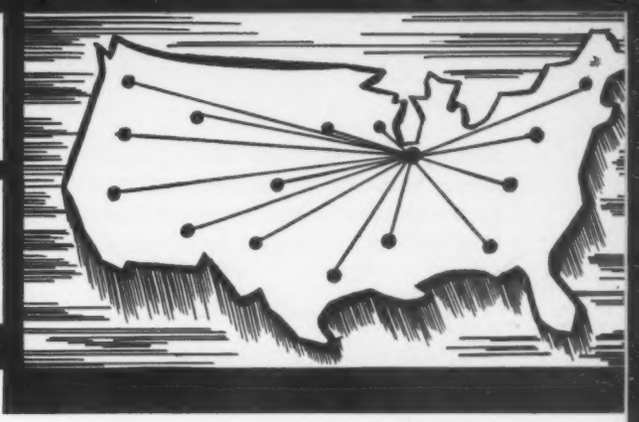
THE exchange of papers between the Institute of British Foundrymen and the A.F.A., initiated in 1921, is continuing this year, as it has been found more important than ever during these war times to maintain this exchange of ideas.

The paper from the I.B.F. for the 1942 Cleveland Convention, A.F.A., has been prepared by C. H. Kain and L. W. Sanders of Lake & Elliott, Ltd. Their paper —*"Production of Uniform Steel for a Light Casting Foundry"*— covers data on basic electric and side blow converter practice.

Two A.F.A. members are contributing exchange papers to the I.B.F. meeting this year. Dr. N. E. Woldman, Eclipse Aviation Div., Bendix Aviation Corp., Bendix, N. J., is submitting a paper on *"Aluminum Castings in Aircraft Work,"* and Carl F. Joseph, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich., one on *"Pearlitic Malleable Iron."*

From Fort Pitt Steel Casting Co., McKeesport, Pa., comes this picture of men meeting under the American flag pledged to "Remember Pearl Harbor" through plant co-operation and patriotism. The men are (left to right) H. H. Nichols, treasurer, Fort Pitt Steel Casting Co.; Fred Grotts, president, Fort Pitt Steel Casting Co.; Ralph Shafer, superintendent; and employees Charles Oncea, Edward Flanagan, Ricca Tassone, Peter Tassone and Harry Wintermyer.

Chapter Activities



Packard Motor Company Night Held at Detroit

By O. E. Goudy,* Detroit, Mich.

THE Detroit chapter held "Packard Motor Company Night," on January 15, at Huyler's Men's Grill, with about 100 in attendance.

Following committee chairman announcements, Chapter Chairman V. Crosby, Climax Molybdenum Co., Detroit, introduced O. F. Carpenter, foundry superintendent, Packard Motor Car Co., Detroit, who led the discussion on "Modern Techniques in Automotive Casting Operations." After reviewing some of the history in connection with Packard Motor Company's work on marine and aircraft engines, Mr. Carpenter covered each phase of the operations as they apply in their foundry. Using slides to illustrate each phase and after each of which questions were asked, a general discussion took place, thereby making it a very much interested clinical meeting.

Starting with their core room practice, Mr. Carpenter illustrated the results of tests on several sand mixtures, making particular mention of the advantages of silica sand as regards to expansion and contraction, following which he covered the various sand preparation and molding units.

Several very interesting points were brought out in connection with their experience as to time after pouring and method of shaking out cylinder blocks, also the matter of keeping cylinder heads flat, and how they made pattern corrections to allow for this, were covered.

While covering the cleaning room phase of their operations, Mr. Carpenter told of their experience and success of using malleable iron blades and shot for their shotblast, thereby eliminating the use of costly alloy blades in their wheels.

As a second part to this meeting, Mr. Carpenter introduced William J. Rogers, foundry metallurgist, who covered the melting and pouring practice.

One of the interesting points brought out by Mr. Rogers was their experience of bringing the iron from the cupola with a lower silicon than that desired in the casting, and making a late addition of ferro-silicon in the cupola spout, generally raising the silicon about 0.20 per cent, and thereby eliminating ferrite spots and having some control over the graphite formation.

*Kelsey-Hayes Wheel Co., and Reporter, Detroit chapter.

Phillips Reviews Steel Developments at New York

By R. E. Ward,* Bendix, N. J.

"SIGNIFICANT Developments in the Steel Foundry Industry During Recent Years" was discussed by Henry D. Phillips, plant manager, Lebanon Steel Foundry Co., at the February meeting of the Metropolitan chapter, held at the Essex House, Newark, N. J.

K. V. Wheeler, chapter director, American Steel Castings Co., Newark, N. J., serving as technical chairman, before presenting the speaker, cited the rule-of-thumb methods used in the manufacture of steel castings during the last war and pointed out the ever-increasing role steel castings are playing in today's defense production.

Mr. Phillips listed seven factors as contributory to the rapid strides in the improvement of steel castings, and with slides supplementing his talk, he explained each point.

Scientific control in steel making, such as the viscosity and density tests now performed on slag, insure a better grade of steel. The new developments and better control have brought acid converter steels back into the picture with properties heretofore unattainable.

Room temperature and high temperature tests of cores have shown the advantages of additions, such as basic oxides, as secondary binders to prevent high temperature cracking of cores and subsequent veining in the casting.

Directional solidification research, started by Briggs and Gezelius, has probably been the largest contributing factor to sounder castings. The importance of this knowledge in pattern design cannot be overestimated.

Radiographic and magnetic inspection, aside from being a nondestructive test for the customer, have been an invaluable aid to the foundrymen for studying the effects of different casting procedures.

Welding, heat treatment and a scientific production program all contribute to good economical steel castings which today,

*Metallurgist, Eclipse Aviation Div., Bendix Aviation Corp., and Assistant Chairman, Publicity Committee, Metropolitan chapter.

through the elimination of guesswork and the adaptation of the forementioned developments, are finding ever broadening applications.

Chesapeake Presents Round Table Talks

By Frederick Bruggman,* Baltimore, Md.

REAL satisfaction can be achieved when one can discuss a "pet" theory, practice or difficulty with a group of men who are all in the same boat. Such was the case at the Round Table Discussions held by the Chesapeake chapter at their regular meeting on Friday, January 23.

The gray iron, steel and non-ferrous members divided into groups and each member had the opportunity to ask questions or give information about each others problems. The interest shown at these discussions is plainly visible in the pictures of the groups which were snapped at random. R. T. Covington, foundry superintendent, American Hammered Piston Ring Div., Baltimore, Md., headed the table discussing gray iron castings; J. E. Crown, Naval Gun Factory, Washington, D. C., chapter vice chairman, headed the table discussing steel castings; and E. W. Horlebein, The Gibson & Kirk Company, Baltimore, Md., chapter chairman, headed the table discussing non-ferrous castings. Many important and interesting points were brought out by the members and we are sure that all those who attended enjoyed a very profitable and pleasant evening.

*Gibson & Kirk Co., and Reporter, Chesapeake chapter.

Porosity Discussed by Sims at Chicago Meeting

C. E. SIMS, supervisor of alloy steel research, Battelle Memorial Institute, Columbus, Ohio, was the guest speaker of the February 9 meeting of the Chicago chapter. A good crowd of 150 local foundrymen turned out for the talk held in the Top-of-the-Town Restaurant. Presiding officer at the meeting was Chapter Chairman L. L. Henkel, Interlake Iron Corp., Chicago, Illinois.

On hand at this meeting was Association Vice President D. P. Forbes, president, Gunite Foundries Corp., Rockford, Ill. He spoke briefly on a few of the Association's activities and commented upon the 46th Annual Convention.

The speaker's subject was "Porosity in Cast Metals" and with the aid of a number of interesting slides, he covered his subject quite thoroughly. Having in progress at Battelle a series of investigations on the much discussed subject of hydrogen in steel, Mr. Sims was able to give some first hand information as to what effect hydrogen had on cast metal porosity. His talk was well received as was shown by the amount of discussion following his presentation.

A movie on "The Fundamentals of Oxyacetylene Cutting and Welding" was shown through the courtesy of The Linde Air Products Co.

Photos, Courtesy F. Bruggman, Gibson & Kirk Co., Baltimore, Md.

Round table discussions were on the program at the January meeting of the Chesapeake chapter and the cast iron men (top—left), non-ferrous men (top—right) and cast steel men (bottom—left) seem to be conducting very good sessions. A few visitors at this meeting are shown in the bottom right photograph. They are (left to right) E. K. Smith, Army Ordnance Dept., Washington, D. C.; E. P. Strothman, vice president, Pangborn Corp., Hagerstown, Md.; John Leys, Lynchburg Foundry Co., Lynchburg, Va.; and S. M. Brah, Rustless Iron & Steel Co., Baltimore, Md.

Scrap Discussed at Grand Rapids Meeting

By Max Amos,* Muskegon, Mich.

CHAIRMAN D. F. SEYFERTH, West Michigan Steel Foundry Co., Muskegon, presided over the February 2 meeting of the Western Michigan chapter. Approximately 85 members turned out to hear Edwin C. Barringer, executive secretary, Institute of Scrap Iron and Steel, Washington, D. C. Program Chairman C. P. Ziegler, Grand Rapids Foundry, Grand Rapids, acted as master of ceremonies.

A coffee talk was presented by Roger Allen, newspaper columnist, who spoke on current world events in a very humorous manner that made many forget their troubles.

When Mr. Barringer began his lecture he really gave the foundrymen present the low-down on the scrap situation of today and what to expect in the future. Among the interesting statistics related by the speaker was the fact that twice as much scrap was used in 1941 as was used in the first World War, and it amounted to a half billion dollars worth of business.

*Standard Automotive Parts Co., and Secretary-Treasurer, Western Michigan chapter.

Booth at N.I.-S.W. Talks of Silvery Pig Iron

By J. R. Cochran,* Rockford, Ill.

BRADLEY BOOTH, service metallurgist, Jackson Iron & Steel Co., Jackson, Ohio, was the main speaker at the February 10 meeting of the Northern Illinois-Southern Wisconsin chapter, held at the Hotel Nelson, Rockford, Ill. Chapter Chairman George Minert, Gunite Foundries Corp., Rockford, presided over the meeting. Some 40 members and guests were present to gather some new pig iron information.

The speaker gave a highly interesting and informative talk on the history connected with the development of cast iron with special reference to the factors which influenced the founding of the silvery pig iron industry. His talk was illustrated with slides of his company's plant and their operations. Mr. Booth had with him an exhibit of samples of different grades of silvery pig, furnace slag, fuels and other items.

*Metallurgist, Sundstrand Machine Tool Co., Foundry Div., and Technical Secretary, Northern Illinois-Southern Wisconsin chapter.

Priorities Discussed at Cincinnati Meeting

By Henry M. Wood,* Cincinnati, Ohio

GUEST at the February 10 meeting of the Cincinnati chapter was Association Vice President D. P. Forbes, president, Gunite Foundries Corp., Rockford, Ill. Chapter Chairman Wm. Ball, Jr., Edna Brass Mfg. Co., Cincinnati, presided over the meeting. On hand for this all-important session were 60 members and guests.

Vice President Forbes was introduced to the assembly and he gave a very delightful talk on A.F.A. activities, including such items of interest as the 46th Annual Convention, membership, publications and other topics.

Speaker for the evening was C. E. Meyers, priorities field service, WPB. He spoke about the "Operation of Priorities." Because all of the country's foundries are operating under priority regulations, the members had individual interest in the subject which was very ably handled and discussed by the speaker. Some of the phases covered by Mr. Meyers were priorities, why we have them and how they work; compliance, the enforcement of priority regulations and exporting. The variety of problems was illustrated by the number of questions.

*W. W. Sly Mfg. Co., and Secretary, Cincinnati District chapter.

Lorig, Mooney Speak at Central Indiana

By R. A. Thompson,* Indianapolis, Ind.

DR. C. H. LORIG and E. D. Mooney were the guest speakers at the Central Indiana chapter meeting held February 2 at the Washington Hotel, Indianapolis, Ind. Chairman H. B. Harvey, Indiana Foundry Corp., Muncie, Ind., had charge of the evening affair. Dinner was served to 70 members and 40 more came in for the technical talks.

Dr. Lorig, Battelle Memorial Institute, Columbus, Ohio, spoke to the gray iron group on "Control Tests for Gray Iron." He discussed chill tests, temperature measurements, hardness test, transverse and tensile tests and the limitations of these tests.

In the non-ferrous session Mr. Mooney, Federated Metals Div., American Smelting & Refining Co., Whiting, Ind., presented "Bronze Castings in Defense Program." The speaker's practical experience made his presentation worth while to all producers of non-ferrous products.

*Electric Steel Castings Co., and Secretary, Central Indiana chapter.

Sand Control Stressed By Jones at Ontario

By G. L. White,* Toronto, Ont.

PRACTICAL experience as superintendent of a number of foundries in the United States, combined with a thorough knowledge of sand, enabled Jack Jones, Great Lakes Foundry Sand Co., Detroit, Mich., to present an interesting new picture of the importance of sand control to the Ontario chapter at its meeting at Toronto, January 30. Chapter Chairman N. B. Clarke, Steel Co. of Canada, presided.

In the introductory portion of his talk, Mr. Jones outlined very briefly the occurrence and preparation for market of a number of important types of foundry sand. He also referred to the relatively complex mixture existing in a foundry sand, upon which sand control procedures must operate satisfactorily.

Mr. Jones discussed briefly the principal properties determined in sand control, including moisture, permeability, dry and green strength, and grain sizes. The equipment necessary for elementary and for advanced sand control was mentioned and it was shown that improper mounting of equipment, especially the rammer, might make results absolutely worthless.

Dealing not so much with the technique of sand control procedures as with the application of results in the foundry, Mr. Jones brought out a very interesting point in regard to the relationship between permeability and speed of pouring of the metal. In two foundries pouring the same castings, it may be found that one uses sand with a vastly higher permeability than the other, and yet both appear to obtain comparable results. In such a case, the speed of pouring is undoubtedly important, for while permeability governs the speed with which the air in the molds may pass through the sand, it must be remembered that the speed of passage required depends directly upon the speed of pouring of the metal.

The importance of sand control is emphasized by war conditions when foundries find themselves in a period of exact testing, with the slightest flaw resulting in the rejection of a casting. In order to meet such specifications, foundries must face the problem of more efficient control of their processes and in this should be included sand control.

*Westman Publications, Ltd., and Secretary-Treasurer, Ontario chapter.

The Wisconsin Chapter Boosts Its Attendance

THE Wisconsin chapter which has set such a splendid record in all of its activities has shown what good organization can do. Through its policy of having committees active and distributing work among a large number of members and constantly bringing in the younger men to show what they can do, this chapter now has set a pattern for all the chapters to follow.

The Wisconsin chapter, while boosting attendance at its regular monthly meetings through presenting many group discussions, has found that an attendance committee proves helpful. This attendance committee, under the chairmanship of D. W. Thiem, Pollard Oil Products Company, has shown that it can get results. The attendance at the meetings now ranges in the neighborhood of 250 and sometimes over that number. One cause for this increased attendance is that the attendance committee sees that all those present fill out slips and the committee then follows up those who register, getting them out for the following meeting.

To aid in getting the attendance slips properly filled out, the committee has prepared an attractive pencil which has engraved on it the words, "Wisconsin Chapter, A.F.A." One of these pencils is given as a prize at each meeting to the one whose slip is drawn from a box and, if properly filled out, receives the pencil. If the card is not properly filled out, another slip is drawn. The accompanying picture shows attendance Committee Chairman Thiem presenting Craig Mills, Lakeside Malleable Casting Co., Racine, the award for the January meeting.

(Photo courtesy John Bing, A. P. Green Fire Brick Co.)
The Wisconsin chapter gives an engraved pencil as a prize at each of their monthly meetings to a member who has properly filled out his attendance card. Here is Attendance Committee Chairman D. W. Thiem, Pollard Oil Products Co., Milwaukee, awarding Craig Mills, Lakeside Malleable Casting Co., Racine, the pencil at the January meeting.

Reviewing the Activities of Chapter Lecture Courses

WITH five meetings of the Chicago chapter's annual lecture course already held, it is evident from the speakers, papers and attendance that another successful educational course is well under way. This year the chapter inaugurates the first lecture series of a four-year educational course designed to teach ambitious young men subjects that are practical and useful in their everyday foundry work. Lectures this year are held on Tuesday evenings, beginning at 7:15 o'clock at the Peoples Gas Building Auditorium, 122 S. Michigan.

On March 3 and 10 Professor V. L. Sherman, formerly of Lewis Institute, and consultant, will elaborate on "Blue Print Reading and Elementary Drawing." Under the heading of "Patterns and Pattern Design" such well known foundrymen as M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill.; E. J. Brady, Western Foundry Co., Chicago; and H. K. Swanson, consulting patternmaker, East Chicago, Ind., will speak on March 17, March 24 and March 31, respectively. The course will end with a "Castings Clinic," conducted by W. A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee, Wis.; R. Frazier, Hansell-Elcock Co., Chicago; and A. S. Klopf, Hansell-Elcock Co., Chicago, on April 7 and 14.

The Chicago chapter lecture course committee is composed of the following men: *Chairman*, L. F. Lottier, Peoples Gas, Light & Coke Co.; *Secretary*, M. E. Johnson, Whiting Corp., Harvey; H. K. Briggs, Miller & Co.; J. D. Burlie, Western Electric Co., Inc.; H. Choppie; Prof. L. J. Haga, Kaydon Engineering Co., Muskegon, Mich.; L. A. Hahn, Sivyer Steel Casting Co.; A. S. Klopf, Hansell-Elcock Co.; R. A. Lindgren, Wisconsin Steel Co.; C. G. Mate, Greenlee Foundry Co.; Martin Rintz, Continental Roll & Steel Foundry Co., East Chicago, Ind.; L. H. Rudesill, Griffin Wheel Co.; H. M. St. John, Crane Co.; and Paul Skirha, Crane Co.

University of California to Repeat Course

By T. J. Adams,* Pittsburgh, Calif.

The University of California, Berkeley, completed its foundry lecture course some time ago, but to the University officials the memory lingered on. So pleasant was the memory to the school board they asked that the course be repeated and extended its time to cover an 18-week period.

In the first course 29 men enrolled and 22 completed it and all expressed themselves as being thoroughly satisfied and that

*Columbia Steel Co.

the course met their needs. The text for the course included the Association's *Cast Metals Handbook* and was of inestimable value to student instruction.

The new course being sponsored by the chapter through the co-operation of the school board will include the following subjects: Design of pattern equipment, recommended pattern allowances, points to be considered in casting design, the significance of strength and ductility tests of metals, cast steel, properties and applications of carbon cast steels, properties and applications of low and high alloy cast steels, malleable iron, testing and grading of foundry sands and clays, cast iron, alloy cast irons, the microscope in elementary cast iron metallurgy, the cast iron equilibrium diagram and radiography of metals.

Prizes to Birmingham Apprentices

The Birmingham District chapter, as a fitting climax to their Apprentice Training Course, are holding a contest to determine the outstanding apprentices who have been attending these lectures. The contest started with the February 13 meeting and will cover the final four meetings of the course, three meetings and one examination. The prizes are to be defense bonds of $50, $25 and $25 denominations for the first, second and third places respectively.

Detroit Begins Third Annual Lecture Course

On Friday evening, February 27, the Detroit chapter officially opened their Third Annual Lecture Course. The initial speaker for this meeting was W. Harvey Payne, president, Hydro-Arc Furnace Corp., Chicago, Ill., who spoke on "Electric Steel Melting Practice."

The lectures this year are being held on Friday nights at 8 o'clock in the University of Detroit's Chemistry Arena, McNichols and Livernois Roads. Six sessions have been scheduled with a leading authority prepared to talk on such subjects as steel melting, malleable iron, cupola operation and magnesium foundry practice.

The program will run through March and up to April 3. Frederick Melmoth, vice president, Detroit Steel Casting Co., Detroit, will be the March 6 speaker and his subject is "Open-Hearth Steel Melting Practice." On March 13 Carl Joseph, metallurgist, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich., will discuss "Pearlitic Malleable Iron and Armasteel." Victor E. Zang, Unitcast Corp., Toledo, Ohio, will present some "General Steel Foundry Problems" at the March 20 session. Lecture number 5, March 27, will be conducted by S. C. Massari, Association of Manufacturers of Chilled Car Wheels, Chicago, Ill., and he will talk on "Cupola Theory and Operation." The last lecture, number 6, on "Magnesium Foundry Practice" will be handled by M. E. Brooks, chief foundry metallurgist, Dow Chemical Co., Midland, Mich., April 3.

The Educational Committee responsible for this excellent line-up of speakers and subjects are R. G. McElwee, Vanadium Corp. of America, *chairman;* O. L. Allen, Pontiac Motor Div., General Motors Corp., Pontiac; F. A. Melmoth, Detroit Steel Casting Co.; O. E. Goudy, Kelsey-Hayes Wheel Co.; J. E. Coon, Packard Motor Car Co.; L. W. Thayer, Cadillac Motor Car Div., General Motors Corp., Cadillac; Donald Yost, Budd Wheel Co.; and A. H. Allen, *The Foundry.*

The committee and chapter also is indebted to Dean C. J. Freund, college of engineering, University of Detroit, and his associates for their courtesy and co-operation in offering their facilities for the lecture course.

FoundryWork Stressed in Trailblazer Booklet

A BOOKLET published by the Trailblazers, Champaign, Ill., entitled "Your Place in Life," contains an article by A.F.A. Assistant Secretary N. F. Hindle concerning foundry work This publication is a handbook used to supply young men with information on the opportunities and requirements of various trades and professions.

Knight Talks on Sand at Western New York

By Eliot Armstrong,* Buffalo, N. Y.

THE February 6 meeting of the Western New York chapter was well attended in spite of unfavorable weather, many members apparently being determined to hear L. B. Knight, Jr., National Engineering Co., Chicago, Ill., talk on "Sand." The speaker handled his subject well and high-lighted it with some exceptionally fine slides.

The chapter's annual stag party was held January 16 with a full house to help make the party a real affair. A dinner was served and a well prepared floor show followed. Frank E. Bates, committee chairman, and the rest of his committee were praised for their fine work in putting on the party in such grand style. It is hoped that more like this one will appear on the chapter's schedule for next year.

*Inter-Allied Foundries of New York State, and Secretary, Western New York chapter.

Col. Rose Addresses Pittsburgh Foundrymen

By R. L. Hartford,* Pittsburgh, Pa.

RATIONAL treatment of the raw material problems of the foundry industry must be accomplished soon if the industry is to give its best in the war effort, according to Col. W. W. Rose, Gray Iron Founders' Society, speaking at the January meeting of the Pittsburgh Foundrymen's Association.

Col. Rose emphasized the need for a confiscatory scrap search, and outlined the job that certain factors in the industry, including his own organization, are doing to further this job in Washington councils. Outlining the job to be done, he indicated that technical assistance is being made available for the service branches in order to show when castings might be used to best advantage insofar as speed in our defense program is concerned.

There are many other jobs which need to be done to correlate the capacity of American foundries with the needs of

*Pittsburgh Editor, *The Foundry.*

America's war effort. Some of these include making known the available facilities of the industry, its limitations and special applications for production of military and naval equipment; educating military designers to use castings where most economical; educating foundrymen themselves in the best methods of securing the exact tolerances needed in war materials; securing proper ratings for foundries to insure flow of materials and supplies with which to do the job.

Group Sessions Held at Wisconsin January Meeting

By G. K. Dreher,* Milwaukee, Wis.

ANOTHER successful group session evening marked the January 16 meeting of the Wisconsin chapter at which 225 foundrymen were first treated to a showing of a motion picture entitled "Unfinished Rainbows," loaned through the courtesy of the Aluminum Company of America.

Conference Committee Chairman Howard Waldron, Nordberg Mfg. Co., explained the program arrangements. The Foundry Conference, according to all reports, is shaping up as one of the most successful yet to be held.

The meeting then broke up into the various groups.

*Mgr., Ampco Metal, Inc., and Secretary-Treasurer, Wisconsin chapter.

Gray Iron Group

Chairman Frank Kulka, Motor Castings Co., introduced F. A. Pample, Chain Belt Co., who gave a very interesting talk on "Cost of Material Handling and Good Housekeeping," with Harry Ladwig, Allis-Chalmers Mfg. Co., as chairman of the group session.

Considerable discussion was had on feasibility of sand handling equipment for small two or four-man machine units; also relative to cost, desirability and flexibility of sand handling equipment for large units. General opinion was that a majority of improvements made in foundry practice involved mechanical handling of material or metal, although through close observation, many important savings can be made through good housekeeping, developing a definite sequence of operations, eliminating loss of time—layout of flasks and sand piles on floors with reference to molding machines.

Discussions developed on number of tons of material handled per ton of castings shipped, and cost per man on sand unit installation that was profitable.

Malleable Group

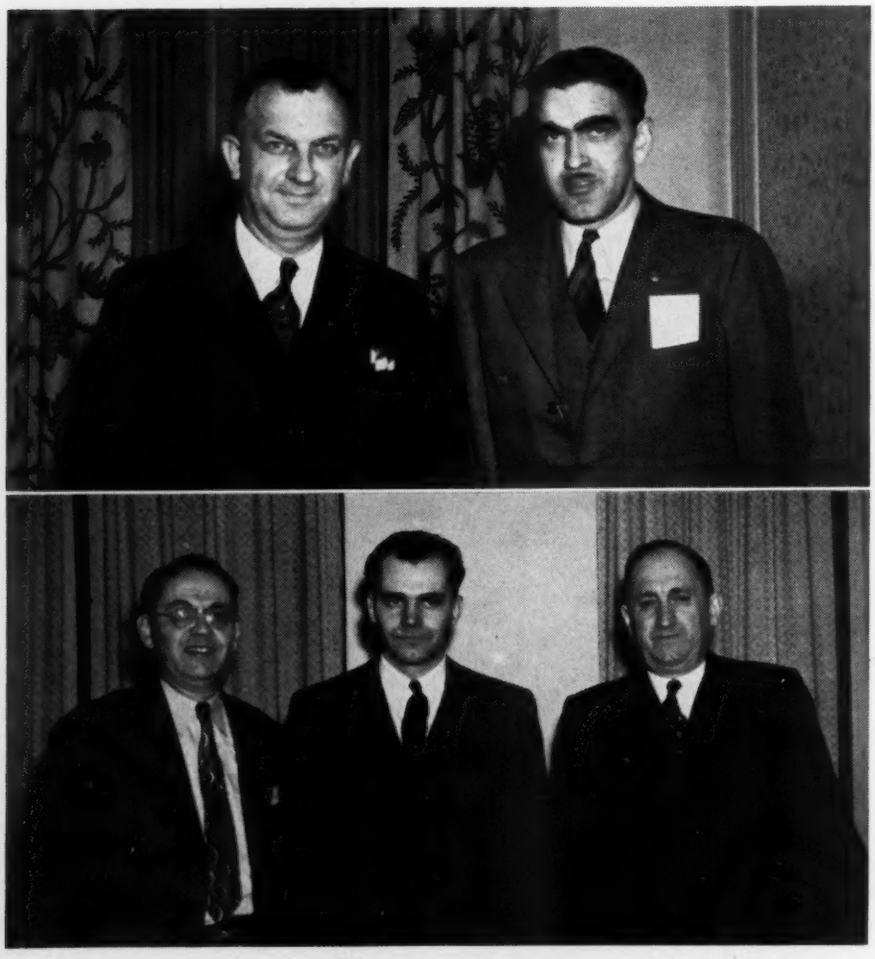
E. C. Zirzow, sand control man, National Malleable & Steel Casting Co., spoke on the subject of the "Practicability and Cost of Natural Bonded Sand vs. Synthetic Sand." W. B. Hansen, Wisconsin Appleton Co., was chairman of this session.

The meeting was well attended and interesting discussions ensued from the speaker's address.

Non-Ferrous Group

The Non-Ferrous group discussed "Patterns for the Jobbing Foundry," under the chairmanship of L. J. Andres, Gerlinger Brass and Aluminum Co. Alfred M. Fischer, Chas. Jurack Co., was the speaker and discussion leader. The Wisconsin chapter was privileged to have the actual pattern equipment produced in the 1941 National Apprentice Contest.

Following a few preliminary remarks by Mr. Fischer, the evening was largely spent discussing the various apprentice pattern equipment on display with respect to methods of molding and gating, translating many of the comments into work now in the various members' shops.



(Photos courtesy John Bing, A. P. Green Fire Brick Co.)
A few of the personalities at the Wisconsin chapter January meeting.

Members agreed to take one of these patterns into their shops for the purpose of making actual castings therefrom, which will be on display at the Fifth Annual Regional Conference.

After considerable bantering between patternmakers and foundrymen in attendance, it was unanimously agreed that more effort should be put into working with the designing engineer toward the ultimate goal of designing more castable castings, which would result in better castings at lower cost.

Steel Group

The steel division devoted its meeting to a discussion of core and molding sands. Paul Powers, Maynard Steel Casting Co., led the discussion on core sands, giving a summary of the core sand practice at his plant. Fred Pritzlaff, The Falk Corp., acted as session chairman. Of the many phases of core sand practice discussed, the following seemed to create the most lively discussion: Use of iron oxide to prevent finning; use of both bentonite and oil in the same mixture; the use of cereal binders and the temperature at which they lose their strength; burning in; and the relative merits of a silica flour sand and a fine sand.

The molding sand discussion was led by Chas. Fuerst, Falk Corp. Among the topics which Mr. Fuerst discussed were the following: The advantages and disadvantages of crude and washed and dried sand; fine vs. coarse sand; the extent to which old sand can be used as a facing sand; characteristics of the various binders; and importance of milling practice.

New England Sponsors Unique Quiz Program

By M. A. Hosmer,* Boston, Mass.

THE regular monthly meeting of the New England Foundrymen's Association was held on February 11, at the Engineers Club, Boston, Mass. There were 75 members and guests present. The program took the form of a quiz, the general topic being "How Much Do You Know About the Foundry?" R. F. Harrington, Hunt-Spiller Mfg. Co., chairman of one team, opposed a second team captained by Association President Raymond Meader, Whitin Mfg. Co., Whitin, Mass.

The questions were asked by "Dr." Walter M. Saunders, Jr., Providence, R. I., and they varied considerably from grinding wheels to cupola operation.

Defense stamps were given for correct answers and the scores were carefully kept by Association Vice President A. W. Calder, New England Butt Co., Providence, R. I. At the conclusion of the quiz, a jack pot question was asked. Each person was to write on paper as many types of casting defects he could think of in a given period of time. The list of 36 casting defects published in the November, 1941, issue of *American Foundryman* was used in judging the winner. Winners of this contest will be announced at a later meeting of the Association.

Winner of the quiz program was Harrington's team and it was unanimously voted to turn the money prize over to the Red Cross.

*Chemist, Hunt-Spiller Mfg. Co., and Reporter, New England Foundrymen's Association.

F.B.I. Man Speaks Before A.F.A. and Steel Founders

By Jack Kelin,* St. Louis, Mo.

MEMBERS of the Steel Founders' Society of America (St. Louis Area) met with the St. Louis District chapter, American Foundrymen's Association, in a special dinner meeting Friday evening, February 13, at the De Soto Hotel, St. Louis.

Chapter Chairman Lloyd Farquhar, American Steel Foundries, East St. Louis, Mo., Steel Founders' Society, and Chapter Chairman Carl Morken, Carondelet Foundry Co., St. Louis, Mo., American Foundrymen's Association, acted as co-chairmen of the meeting, each making his regular announcements in connection with his group's activities.

Luther Kleber, chairman of the Apprentice Training Committee, A.F.A., described in some detail plans for the patternmaking apprentice contest being held as a prelude to the national contest in Cleveland. He urged that those who had not as yet indicated their desire to participate would do so in order that the committee's work could be completed.

Following this business session, Co-chairman Lloyd Farquhar introduced the speaker of the evening, A. E. Littleland, St. Louis division, Federal Bureau of Investigation. Mr. Littleland spoke at some length outlining the work of the F.B.I. as it is familiarly known and then offered many suggestions as to plant protection during the war period in this country. His talk was most favorably received by the large group.

*Federated Metals Div., A. S. & R. Co., and Secretary-Treasurer, St. Louis District chapter.

Quest Speaks Before Minnesota Student Group

By Sidney Silberg,* Minneapolis, Minn.

THE January 22 meeting of the Minnesota University Student Group was held in the Minnesota Union building with J. F. Quest as the evening's speaker. Jarl A. Haven, president of the group, presided at the meeting.

The lecturer, who is president, Jeffery Quest Foundry Co., Minneapolis, gave an address on "Cost Systems and Their Importance in the Foundry Business." His talk was particularly interesting as he illustrated his comments on the importance of cost systems with some of his own experiences in building up his own foundry. Due to the demand of many of the student members, Mr. Quest did not confine his talk entirely to costs but described some of the processes by which cast iron pipe is produced in his foundry.

*Secretary, Minnesota University Student Group.

Caterpillar's Reclamation Department Hits Valuable Industrial "Paydirt"

The Caterpillar Tractor Co., Peoria, Ill., has instituted a reclamation department in their plant that is showing how to turn odds and ends into dollars and cents. This article reveals some interesting facts directly related to foundry work such as the reclaiming of borings, both gray iron and nickel alloy; and the conservation and use of foundry scrap. What has been started at this plant is not directly applicable to all shops but can be developed to cover numerous foundries so as to help alleviate the shortage of various materials.

LIKE all well-managed plants, the Caterpillar Tractor Co., Peoria, Ill., has always encouraged the salvage and reclamation of materials by its various departments. However, in keeping with the trend of industry toward advancement in reclaiming waste, the management four years ago formed the reclamation department for the purpose of devoting its entire time to salvaging and reclaiming. With everybody in the plant convinced of the reclamation department's potentialities, and willing to lend a helping hand, a chance idea of today may become a money and material saver of tomorrow.

Types of Equipment Required

Various types of machinery and equipment are required to carry on the extensive activities of the reclamation of materials. These pieces include a briquetting machine, scrap steel baler, hacksaw blade grinder, woodworking machine, ripsaw, cut-off saw, alligator shear, punch press and squaring shear.

These pieces of equipment are used for various purposes in this company's scheme of things. For example, the briquetting machine is used for making borings and turnings into useable charging material, while other equipment is used to overhaul and repair broken or badly damaged tools used on the assembly line or in the shop. The company feels that today, with tools at a premium, the reclamation department will restore them to release tool time for manufacture of other products required in the war program.

The reclamation department occupies several locations throughout the huge plant. To these locations, strategically placed to eliminate extra handling of material to be salvaged or reclaimed, comes the average scrap—metals, steel clippings, crop ends and trim, aluminum borings, steel turnings, gray iron borings and other miscellaneous items.

Reclamation's Chief Function

The chief function of the division concerns disposal of all questionable non-productive material. The reclamation department can scrap, destroy, sell, give away or prepare material for re-use, ever striving to secure the greatest value for every item. The chief problems facing this department, in coping with every item, have always been: "Can this item be used in its present condition, or, with economical modifications, be used on any product, or in maintenance work around the plant? Will it be more valuable if sold as scrap? Will it save time, money and space to destroy it?" It is an important part of the division's business to determine quickly whether the cost of reclaiming an item is more than the item will be worth.

Fig. 1—Gray iron borings being pressed into briquettes. Approximately 33 tons of briquettes are produced daily.

Reclaiming Gray Iron Borings

The reclamation of gray iron borings pressed into briquettes (Fig. 1) is just one of the many jobs of this department. Borings are dumped into a pit, conveyed overhead into a storage bin, dropped into the hopper of the machine and then metered out for compressing. From this process they are sent to the foundry and charged back into the cupola as iron. Approximately 33 tons of the briquettes are produced daily.

Aluminum turnings and borings are accumulated and segregated for conversion into essential parts, thus conserving any alloys contained. This careful re-use of aluminum, nickel alloy turnings (Fig. 2) and other materials is of even greater importance now as this country battles to conserve its vital materials in the interests of the war program.

Foundry Scrap Yard

The most imposing looking part of the reclamation department is the scrap yard, located near the foundry (Fig. 3). This is the focal point for an endless stream of scrap which is promptly examined and segregated. Each Monday the scrap yard faces a new week with its pile of heavy melting steel de-

Fig. 2—All turnings at Caterpillar are spot checked for alloy analysis. The alloy turnings are segregated and handled separately.

pleted, and when the whistle blows to end the week the same condition exists, but between times some 500,000 lb. are sent on order to the foundry. In its dealing with the foundry, the organization functions like an individual company, receiving and filling orders in carload shipments the same as an outside vendor — whether it is a carload of cast iron, compressed bales, heavy melting steel or alloy iron—in the quantity and at the time needed.

In this yard are apprentices taking the two-year welders' training course. Knowledge of cutting, under actual working conditions, is gained by these apprentices in this department. Since all types and sizes of material must be reduced for foundry consumption — from light sheet metal to heavy steel castings and structural shapes — a wider cross-section of experience is available here than in any other department. A man's mistakes are seldom of any consequence inasmuch as he is producing scrap. The reclamation division as a whole, in fact, offers an ideal training course for apprentices, due to its broad scope of activities which encounter every phase of manufacture.

All material 12-gauge and lighter, with no potential use except scrap, is compressed into bales for foundry use along with skeleton stock, wire, nails, slugs, stringers, rusty barrel hoops and other items.

To a company that manufactures its own parts, the scrap yard has a particular significance, for it returns to the foundry for re-use scrap steel and iron with an analysis already known. Much scrap is re-used as new. The yard expert knows materials and sizes used in the machine shop and supervises assortment of the waste accordingly. Heavy channel, structural shapes, rails, pipe, and other articles are fed to the powerful alligator shear and cut to foundry charging dimensions as heavy melting scrap.

Foundry Sand Committee Meets in Cleveland

ON FEBRUARY 6 and 7, a meeting of the Executive Committee of the A.F.A. Foundry Sand Research Committee was held at the Statler Hotel, Cleveland, Ohio. The meeting was held to hear reports of subcommittee chairmen, discuss the reports and lay out a program for drawing up methods of performing additional tests on foundry sand. Revision of the present handbook on sand testing, "Testing and Grading Foundry Sands and Clays—Standards and Tentative Standards," also was discussed.

The most important work of the meeting was that of discussing individually each of the standard and tentative standard tests now given in the sand test book. A later report will enumerate those which have changed status.

An important decision of the Executive Committee was to establish a committee to supervise the establishment of standard tests applicable particularly to core sands.

Fig. 3—The scrap pile where scrap metals are converted into valuable compressed bales for the foundry.

Abstracts

NOTE: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.

When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th Street, New York, N. Y.

Castings

MARINE ENGINES. *"Bed Plate Castings,"* by Leslie Clarke, *Canadian Metals and Metallurgical Industries,* vol. 4, No. 12, December, 1941, pp. 332-333. This article describes in detail how a bed plate for marine engines, a casting approximately 20 ft. long by 13 ft. wide and weighing 20 tons, with main members ¼-in. thick was casted. An overwhelming majority decided to make the bed in three separate castings, bolted together. However, this company decided that, with necessary equipment, patterns properly constructed, and sound founding practice, these castings could be produced successfully. Closest cooperation between pattern shop and foundry in understanding made this job a success. (Ca.)

Cupola Practice

SMALL DIAMETER. *"Small Diameter Cupola Practice,"* by W. Pola, *Foundry Trade Journal,* vol. 65, No. 1306, August, 1941, pp. 143-144, 146. One of the most important, and most expensive, items of cupola maintenance deals with refractory materials. To make a good job of bricking the cupola well-fitting bricks are essential. A good grade refractory lining put on with care will do much towards a successful cast. A very good daubing mixture can be made with sandstone crushed in a mill, with just enough fireclay to bind it together and a small addition of red sand and coke dust. The red sand appears to supply sufficient iron oxide to frit the mixture to the bricks. Daubing material should be mixed at least one day before using, and should not be applied more than an inch or so thick without some form of solid backing. The average life of the bricks in the 24-in. cupola, melting high percentage steel mixtures, is 16 weeks. In the construction of the hearth bottom the bottom is built up to the level of the taphole with good molding sand (not too damp). The slope from the back to the taphole as slight as possible, just enough to run the metal from all sides to the hole, three-quarters of an inch to the foot being sufficient slope. It is important that the bottom of the taphole be level or a shade lower than the sand bottom. Considering the size of coke most beneficial, medium weight coke, not too dense in structure and broken into sections about 4-in., was found best for small diameter cupolas. In concluding his paper the author discusses burning up the coke bed and burning up the bed by natural draft. (F.)

SMALL DIAMETER. *"Small Diameter Cupola Practice,"* by W. Pola, *Foundry Trade Journal,* vol. 65, No. 1307, September 4, 1941, pp. 155-157. In controlling the blast of a cupola the author has the idea that by using a fan with a greater output than is necessary for normal running, a wider range of melting rates can be used. Control is obtained by a butterfly valve fitted in the wind pipe. The valve is fitted with a pointer, set in line with the butterfly itself, and fixed to the same shaft. Behind the pointer is a dial which is calibrated. Having found the best setting of the valve for starting the heat, it can be repeated from day to day. By use of the butterfly valve, adjustments can be made for a fierce or mild blast. Uneven blast to tuyeres causes trouble in the melting zone. Tuyere dampers have been used in European countries for quite some time. The author presents data on how tuyere dampers were made to fit a large cupola between the inner and outer diameters of the wind box. Dampers operate by shutting the blast off from one tuyere at a time. Dampers fitted to small diameter cupolas will greatly increase the total capacity of the heat and still "drop" clean. Dampers are a great aid in blowing the coke bed up evenly. Melting metal that is kept within close limits regarding silicon and carbon requires accurate weighing of charges. Under charging such topics as danger periods, the function of the split, coke bed height and other subjects are discussed. Several grades of metal can be taken out of the cupola during one heat by using coke breaks or boosters. An example how this is done is explained. Melting a special single charge is best done fourth or fifth from the start, says the author. Special care should be taken in weighing the charge for "specials." Holding the metal in the hearth for good mixing is good judgment. In conclusion the slagging process is commented upon by the author. (F.)

SULPHUR. *"Why Sulphur Pick-Up Varies in Cupola Iron,"* by R. A. Clark, *The Foundry,* vol. 69, No. 9, September, 1941, pp. 54-55, 140. Sulphur in cast iron has long been a subject of much discussion, especially from the standpoint of its pick-up in the cupola. The author in his examination and study for various causes of pick-up discusses his coke analysis, sulphur in raw materials, sulphur values of cokes and average sulphur in cast iron. Although the author's conclusions are far from being complete, the results of his study indicate that it is not the total sulphur content which influences sulphur pick-up from the coke, so much as it is the amount of volatile sulphur present. His experience indicated that the higher the percentage of sulphur volatile, the higher the sulphur pick-up. (F.)

Heat Treatment

FUELS AND FURNACES. *"Fuels and Furnaces for the Heat Treatment of Steel Castings,"* by T. R. Walker and F. Smith, *Foundry Trade Journal,* vol. 65, No. 1316, Nov. 6, 1941. Presented in this study of the three types of fuels available for the heat treating of castings are gaseous, liquids and solids. Of the three types the author believes gaseous fuels have advantages over the other two, since they are easily carried to the furnaces. They can be properly mixed with air without previous preparation, and mostly burn without smoke even in a cold furnace. The control of temperature and furnace atmosphere is easiest with gaseous fuels. In England liquid fuels are used much less extensively than gaseous fuels, especially for heat-treatment furnaces. The liquids consist of mixed hydrocarbons, derived from two sources: as products of the fractional distillation of naturally-occurring oils, practically all of which are imported, and as mixtures obtained by the treatment of domestic tar liquors, produced in the manufacture of town's or coke-over gas. In discussing solid fuels the author lists the various advantages and disadvantages of both coal and coke. (H.T.)

STEELS. *"Heat Treatment of Special Steels,"* by G. W. Barnes, *The Engineer and Foundryman,* vol. 6, No. 5, October, 1941, pp. 215, 217. The correct heat-treatment of tool steels is of the utmost importance, and carelessness or any attempt to cheapen or simplify any of the necessary processes may ruin tools on which hundreds of pounds have been expended in material and labor. Proper heat treatment of high-speed steels entails five processes and four furnaces: Warming, preheating, hardening, quenching and secondary hardening. Each of these processes is explained in detail by the author. (H.T.)

STEEL CASTINGS. *"Fuels and Furnaces for the Heat Treatment of Steel Castings,"* by T. R. Walker and F. Smith, *Foundry Trade Journal,* vol. 65, No. 1317, November 13, 1941, pp. 313-315. If a new furnace is to be installed, the first point to be determined is the nature of the heating medium. The type of furnace is next decided from a knowledge of the operations to be carried out, and of the facilities available in the shop. These details, and the method of handling the articles during charging and discharging, influence the selection of size, shape and type of furnace. While the object of heat-treating is to put a casting into the physical condition required, the cost of the operation must not be overlooked. This is greatly influenced by the intelligence shown in the planning of the operations, and subsequently by the skill of the furnace operators. In discussing various types of furnaces the author describes the batch-type regenerative furnaces and furnaces for medium size stock. (H.T.)

Metallography

LIGHTING. *"Vertical Illumination for Macros,"* by G. K. Manning, *Metal Progress,* vol. 40, No. 2, August, 1941, pp. 172-173. This company has found that in many cases vertical illumination is just as helpful in making macrographs as it is in making a micrograph. The principle used is identical with the principle used on all metallographic microscopes. A No. 1 photoflood bulb in a common photographic reflector, placed 2 or 3 ft. from a plate of diffusion glass, will provide sufficient light to properly expose a negative with a Weston rating of 8 in 3 sec., when the camera lens is stopped to f8. The ground glass used in this laboratory is 8x7-in. and the plate glass which acts as a reflector is 8x10-in. The two may be conveniently held in place by two boards each containing a vertical and 45° slot. Place the plate glass reflector as close to the camera lens as possible and thus keep the distance the light travels from the ground glass to the object a maximum. The object being photographed should be placed in the bottom of a box which has been lined with black photographer's paper to eliminate any glare from direct light striking its corners. Oblique illumination gives no hint of the extremely coarse grain size of the sample, whereas vertical illumination brings out the ferrite pattern that was visible to the eye. Vertical illumination will be found to be very satisfactory when photographing flat or nearly flat surfaces. When it is necessary to indicate contour and depth, oblique illumination serves the purpose far better. (Te.)

Metallurgy

POWDER. *"Powder Metallurgy,"* by F. C. Kelley, *Canadian Metals and Metallurgical Industries,* vol. 4, No. 12, December, 1941, pp. 322-327. The field of powder metallurgy can be divided into two divisions. The first is that applicable to mass production of parts which do not require any high strength, such as oil pump gears, bearings, etc. The second deals with materials which require some outstanding physical characteristic, such as ductile tungsten for lamp filaments, cemented carbides for cutting tools, or sintered alnico for its magnetic characteristics. The vast amount of territory covered, such as history, recent developments, industrial applications and properties of sintered materials, on powder metallurgy is well done. This paper does give those unacquainted with the subject a clearer conception of what powder metallurgy is and furnishes those working in this field with some data concerning physical properties which can be obtained with different materials. (Me.)

Molding

CONSTRUCTION. *"Mold Construction,"* by E. Longden, *Iron and Steel* (London), vol. 14, No. 11, June, 1941, pp. 356-358. There are four fairly well defined classes of molding, namely: green sand molding, skin dried molding, dry sand molding, and loam molding. The author comments on these molding processes in relation to gases, high pressures generated, venting, cores, importance of vent connections and confined gases. (Mo.)

ENGINE CYLINDER. *"Molding Construction and Tackle,"* by E. Longden, *Iron and Steel* (London), vol. 14, No. 14, September, 1941, pp. 433-434. The author explains the pattern making details, construction of the core barrel, core making, molding box construction and molding in relation to making a textile machine carding engine cylinder. This type of casting was chosen by the author to illustrate, principally, the design of a collapsible core-barrel used for quantity production, although there are other interesting features connected with the casting. The method described is the practice followed in making cylinders varying from 24-in. in diameter to 60-in. in diameter, in lengths or widths from 40-in. to 72-in. and in weight from 400 lb. to 2800 lb. (Mo.)

GATES AND RISERS. *"Mold Construction and Tackle,"* by E. Longden, *Iron and Steel* (London), vol. 14, No. 13, August, 1941, pp. 411-413. In many cases the ramming of molding boxes can be facilitated by providing the molder with a wooden frame, the inside of which should be smaller than the inside of the molding box. Instead of immediately placing the drag part over the pattern, the wooden frame can be located over the pattern first and the part round the pattern rammed with greater ease. On complicated patterns it is very laborious to ram sand through the bars of the box. By the use of the frame, the ramming of the sand, release of loose pieces, and locating of loam cakes can be comfortably accomplished before placing the molding box into position. It is then only necessary to ram sand around the space formed by the difference between the size of the wooden frame and the molding box. The author then presents ways that small important castings for gas and oil engines were made through the use of a ring of spray in-gates which allows the metal to be admitted cleanly to the mold at a uniform temperature throughout. He also comments on how gas and oil engine pistons, steam cylinder covers and molding impellers and plain cylinders were gated for the best results. (Mo.)

MARINE ENGINES. *"Producing Marine Engine Castings,"* by Pat Dwyer, *The Foundry,* vol. 69, No. 9, September, 1941, pp. 50-52, 129-132. The company in this article is producing inverted, triple expansion engines rated at 2500 horsepower. A triple expansion engine is one that operates on three cylinders, high, intermediate and low pressure. Steam first enters the high pressure cylinder, expands to a certain extent and enters the intermediate cylinder. From there it passes into the largest, or low pressure cylinder and then passes into the condenser where it is converted again into water for the boilers. Bore of the low pressure cylinder is 70-in. and weighs 18,000 lb. Diameter of the intermediate cylinder is 35-in. and the high pressure is 28¾-in. They weigh 16,500 and 15,000 lb., respectively. All castings are meehanite metal prepared according to proprietary process based on the application of calcium silicide for graphitization of the cementite without otherwise affecting the composition. Physical properties of the metal as cast, heat treated and alloyed are shown in a table of the article. A detailed discussion of the molding technique for these castings is presented by the author. (Mo.)

PERMANENT MOLDING VS. DIE CASTING. *"Permanent Molding and Die Castings Compared—I,"* by Herbert Chase, *Metals and Alloys,* vol. 14, No. 2, August, 1941, pp. 153-160. For those contemplating the use of either die castings or permanent mold castings in certain engineering designs, this article gives comprehensive comparative data on the two types of products. The author discusses the choice of the alloy suitable for either mold or die castings, the relative cost of dies, the over-all, and finishing costs. Comparative production rates are reviewed. Many other phases of the subject such as section thickness, porosity, dimensional accuracy and relative strength also are discussed. (Mo.)

PERMANENT MOLD VS. DIE. *"Permanent Mold and Die Castings Compared,"* by Herbert Chase, *Metals and Alloys,* vol. 14, No. 5, November, 1941, pp. 698-703. This is an outline of considerations having a bearing on a choice between die castings and permanent mold castings and it points out some of the major considerations involved. It is suggested when the engineer is faced with a choice between one or the other of the types of castings dealt with in this article and some definite consideration does not bar either form, he may well make designs for both types and secure comparative estimates. Illustrations give some idea as to the types of parts produced in die cast and permanent mold forms and the article indicates certain factors influencing the choice. Table in the paper gives data furnished by makers of castings of each type or by those who supply the alloys and/or the base metals which are employed. (Ca.)

PLASTER MOLDS. *"Plaster Molds,"* by W. A. Phair, *The Iron Age,* vol. 148, No. 15, October 9, 1941, pp. 74-78, 154-161. A new method of producing nonferrous castings—the Capaco plaster mold process—which holds considerable promise as a means of obtaining unusually close tolerances in the as-cast state, is described in detail for the first time in this article. Production technique, from raw material to finished casting, as practiced in the newest plant to be designed specifically to use plaster molds for production work, is covered in detail. (Mo.)

Pearlite

STRUCTURE. *"The Structure of Pearlite,"* by F. C. Hull and R. F. Mehl, *A.S.M. Preprint No.* 40, 1941, pp. 1-42. This paper is a discussion of the structure and mechanism of formation of pearlite. The literature on pearlite has been reviewed with particular reference to the theory of the formation of pearlite. The genesis of pearlite by a combination of sidewise and edgewise growth is accepted as the theory which furnishes the best explanation for the lamellar nature of pearlite, the constancy of pearlite spacing, the variation of spacing with temperature, and the curvature of cementite lamellae. The mechanism by which pearlite nodules are formed is discussed and attention is called to a mode of transformation, not previously described, in which pearlite nodules grow many times larger than the austenite grains. (S.)

Radiography

MAGNESIUM CASTINGS. *"Radiography—Applied to Magnesium Alloy Castings,"* by P. M. Bailey, *The Metal Industry* (London), vol. 49, No. 15, October 10, 1941, pp. 232-235. There are many minor differences between the radiography of magnesium and aluminum castings. In some tests magnesium castings are examined extensively by screening, but, although many have been tried with this method, it is not felt that this examination is satisfactory. The author stresses the

importance of obtaining an X-ray unit containing the correct sized tube focal spot for magnesium work. In discussing soundness the paper shows that the radiograph should be made so that the various planes, bosses and webs are shown separately. Data is given concerning the usefulness of density filters. A description of the technique employed for examining a large sand casting is explained. In conclusion the author deals with porosity and blowholes. (Te.)

PROGRESS. *"Ten Years' Progress in Radiography,"* by A. J. Moses, *Metal Progress,* vol. 40, No. 5, November, 1941, pp. 771-776. The author describes the advantages in time, sensitivity and penetration of a 1,000,000-volt X-ray tube when examining seams in welded vessels. Welding of drums 5-in. or more thick in the walls is now necessary; such vessels were formerly forged and seamless, but now all the suitable heavy presses are preempted for other defense work. (Te.)

Refractories

CASTING PIT. *"Casting Pit Refractories,"* by J. H. Chesters, *The Iron Age,* vol. 148, No. 22, Nov. 27, 1941, pp. 53-58. Completing this continued discussion of casting pit refractories, the author considers the construction, material, life and causes of failure, and line of improvement of ladle sleeves. He also comments upon the construction of trumpets and guides and presents some facts on runner, center and mold top bricks, tundish tiles, and non-metallic inclusions. (R.)

HIGH-ALUMINA. *"Secondary Expansion of High-Alumina Refractories,"* by J. L. Hall, *Journal, American Ceramic Society,* vol. 24, No. 11, November, 1941, pp. 349-356. Several mixtures of raw and calcined diaspore and bauxite with raw and calcined fire clays were prepared and fired at 2700°F. Specimens were refired at higher temperatures, and the linear changes were determined. Bodies composed of high-alumina grog and fire clay expand in the refire, whereas specimens of fire-clay grog that are bonded with ground raw diaspore exhibit shrinkage. The cause of the secondary expansion and shrinkage of these bodies is discussed. (Re.)

INDUSTRIAL FURNACES. *"Selecting Refractories for Industrial Furnaces,"* by J. J. Offutt, *Industrial Heating,* vol. 8, No. 9, September, 1941, pp. 1014, 1016, 1018, 1020. This is quite a general discussion concerning the various types and grades of refractory products. Particular attention is given to furnaces fired with natural gas. In his article the author points out valuable information in relation to balanced linings, super duty fire brick, high alumina brick, insulating fire brick, necessity for careful installation and influence of furnace atmosphere. In general the author states that the conditions causing most trouble to refractories are excessive temperatures, rapid temperature changes, heavy loads at high temperatures, slagging, abrasion and chemical attack. (Re.)

OPEN-HEARTH. *"Chrome Magnesite Open-Hearth Linings," The Iron Age,* vol. 148, No. 23, Dec. 4, 1941, p. 61. A report taken from the *Stahl und Eisen* translated by A. Mund in *The Iron and Coal Trades Review* discusses the greater durability and production that can be realized by using chrome magnesite in place of silica brick as a furnace lining, in open-hearth furnaces heated with coke oven gas. Chrome magnesite linings in Germany have become very popular since silica linings cannot stand the high temperatures required for the production of high alloy chrome steels and chrome nickel steels with more than 2 per cent chromium. Thermal insulation was much greater with the chrome magnesite lining than with the silica lining, there being a considerable reduction in heat consumption with the former with the thickness of the linings being the same. A comparison is made between the magnesite lining and silica lining of how much heat could be saved with a magnesite lining. It was calculated that over a period of 4288 hr. the heat saved with the magnesite lining was about 17.4 per cent more than with the silica lining, with the increase in furnace output about 6.6 per cent. (Re.)

STEEL LADLES. *"Casting Pit Refractories,"* by J. H. Chesters, *The Iron Age,* vol. 148, No. 21, Nov. 20, 1941, pp. 43-49. This article deals with the refractories used in ladle and ladle accessory construction. In discussing the construction of ladles he presents a typical ladle lining arrangement and then presents data on materials used such as fireclay brick, plumbago (clay-graphite) brick, rammed ladles and basic ladles. In conjunction with this presentation he gives factors influencing ladle life as well as causes of failure. Possible lines of future improvement also are commented upon. In conclusion the author presents material on nozzles and stoppers. (Re.)

Risers

See Molding, Gates and Risers

Safety

EYE INJURIES. *Columbia University, Department of Public Information,* pp. 1-5, 1941. This is a report on a pamphlet prepared by the late Louis Resnick, a staff member of the National Society for the Prevention of Blindness. This report is based on two decades of study in workshops throughout the country. It outlines the eye hazards present in industry and occupations of all sorts, and gives measures that may be taken to eliminate them and to guard workers against those which cannot be eliminated. It is a handbook that should be studied by safety engineers, safety inspectors and others engaged in accident prevention. Approximately 300,000 eye injuries occur every year, and cost employers more than $100,000,000 annually. In the United States more than 80,000 persons have lost the sight of one eye through industrial hazards and close to 8,000 have lost the sight of both eyes. Many other startling facts are presented in this review. (Se.)

Sand

SILICA FLOUR. *"Silica Flour Controls Molding Sand,"* by H. W. Dietert and G. Curtis, *The Foundry,* vol. 69, No. 10, October, 1941, pp. 56-57. In the steel foundry considerable use is made of silica flour additions in both core and molding sand, the reason usually given is that silica flour is added to stop metal penetration. The author tells of how bond A.F.A. standard silica sand was used with 4.5 per cent western bentonite and with varying percentages of silica flour, sufficient water added and mulled for 7 minutes caused the following values to increase: moisture, green compression, green deformation, toughness, dry compression and density. Only two properties decreased in value; namely, permeability and flowability. Various other discoveries are related by the author, such as the effect silica flour has when added to western bentonite or southern bentonite; what effect silica flour additions from 0 to 10 per cent in sand has on moisture; deformation and toughness; what effect silica flour has on the refractoriness of the sand and many other interesting facts. (Sa.)

Testing

PREPARATION. *"Preparing Metallurgical Specimens,"* by Beth Walsh, *The Iron Age,* vol. 148, No. 12, September 18, 1941, pp. 53-57. The primary consideration in polishing is to proceed through graded and successively finer abrasives until the final polishing leaves a scratch-free surface. The attainment of a satisfactory polished metallographic sample depends to a large degree on the utilization of properly designed polishing equipment and methods. In rough grinding on the belt grinder, two grades of belts are used —a 50-grit and a 120-grit. Nos. 1, 0, 00, 000 emery papers are used preceding the polishing. These are followed by a semi-final or airplane cloth and a fine cloth which is of a two-way, heavy-nap material. Lubricants are used on all the emery papers and the coarse and fine polishing cloths. The lubricant is a mixture, about 50-50, of a thin lubricating oil and kerosene. Distilled water is the best base for all semi-final and final polishings. A high-quality, filtered liquid soap is used in small quantities with the distilled water during the polishing of some specimens. An excellent abrasive for the semi-final polish is 600-mesh alundum powder, which is of uniform texture and quality. For the final cleaning, the sample is washed carefully in water, rinsed with alcohol and dried in an air blast. (Te.)

WALL THICKNESS. *"On Testing the Wall Thickness of Castings,"* by B. M. Thornton and W. M. Thornton, *Foundry Trade Journal,* vol. 65, No. 1313, Oct. 16, 1941, pp. 253-254. Any instrument for determining the wall thickness of castings should be portable and sturdily built, independent of external power supply and easy to operate. The method of testing the wall thickness is essentially that of comparing the resistance of a metal wall under test with that of a similar shaped wall of the same material of which the thickness is known. No knowledge of the specific resistance of the material is required. A detailed report of the operation is then outlined for the reader. A method also is described dealing with castings which are being made on the production basis. (Te.)

Training

EDUCATIONAL. *"Educational Training Program Arranged,"* by J. D. Judge, *The Foundry,* vol. 69, No. 10, October, 1941, pp. 54-55, 132-133. The Hamilton Foundry & Machine Co., Hamilton, Ohio, decided to establish a training program for its employes. Enrollment in the course was entirely voluntary on the part of the employes. The course provided for 75 hours of classroom instruction and 75 hours of practical shop work per year. Classroom sessions were of 1½-hr. duration and were held immediately after the completion of the regular day's work. Shop sessions were 4 hours long. The instruction was divided into two classes, namely, direct and supplementary. Direct instruction dealt with subjects intimately related to the usual foundry processes. The supplementary subjects were of a

general nature. The shop instruction course is explained and the three-fold purpose of the course is commented on. (Tr.)

Wage Plan

INCENTIVE. *"A Practical Wage Incentive Plan,"* by Harry F. Blake and Francis A. Westbrook, *The Iron Age,* vol. 148, No. 23, Dec. 4, 1941, pp. 51-55. The new revised wage incentive plan put into effect by the Sullivan Machinery Co., Claremont, N. H., shows that the labor cost has been reduced on the average of 32 per cent and at the same time, the machine operators have averaged an increase of 30 per cent in hourly wages without reducing the original base rates. It is definitely increasing machine shop production, eliminating production bottlenecks, reducing labor costs, and increasing machine operator and foreman wages. A further advantage is that standard times and costs which have been developed enable orders to be scheduled through the machine shop and to selling prices calculated with much greater accuracy than was possible before. The standards used are based on time studies of the different operations on each machine. All standards are based on the idea that a good operator can make a 33 per cent premium, thus providing a real incentive. (Pl.)

Waste

SALVAGE AND DISPOSAL. *"Salvage and Disposal of Foundry Waste,"* by Wm. Y. Buchanan, *Foundry Trade Journal,* vol. 65, No. 1319, November 27, 1941, pp. 343, 345, 350. The author has divided his paper into six sections and discusses the following under each: Melting—Coke and metal from drop, coke breeze and small coke from bins, material from roofs and dust catchers, slag and firebricks; Sand Plant—Metal from oversize delivery, silt and material recovered by magnetic separation; Dressing—Core sand and molding sand, core wires, grids, small iron and sprigs, dust from grinders, etc; Drying Plant—Clinker and ashes from stoves and portable driers and coal ashes from ladles; Molding—Lifters and hangers and recovery of oil-sand cores, and Molding Shop—Cast iron and steel borings and abrasive wheels. The writer has adhered to what is strictly salvage, and took those departments of the foundry which have materials to dispose of and shown how far it is possible to use them. (Wa.)

Wear

RAILROAD FAILURES. *"Railroad Failures in Track and Cars,"* by R. McBrian and P. A. Archibald, *Metal Progress,* vol. 40, No. 2, August, 1941, pp. 189-191. Material failures in general are due to any one or combination of the following factors: poor design, defective material, improper application, faulty fabrication and abuse in service. The examples in this study were taken from the Rio Grande laboratory files and illustrate the application of these principles. The authors discuss such items as arch bar failure, joint bar failure and axle failure. In respect to when design is under suspicion the investigation should be supplemented with stress measurements or photo-elastic study, in order to devise a new shape which will distribute the load-carrying capacity with respect to the actual stresses. If the material lacks sufficient strength, stronger materials must be sought. If the failure is due to faulty fabrication or unnecessary abuse the necessary corrections must be made. (We.)

X-Ray

DEFENSE PRODUCTION. *"Defense Production Aided by X-ray Examination,"* by D. M. McCutcheon, *The Foundry,* vol. 69, No. 11, November, 1941, pp. 65, 148-149. The Ford Motor Co. has been using x-ray examination since 1930 in the development of production castings. This review gives details on the type of x-ray machines they are using and how they are used. The x-ray units have been designed to handle the huge volume of castings destined for large volume airplane construction and it is believed the most complete assemblage of x-ray equipment in the world is being added for foundry development use and semi-production checking. (Te.)

DIFFRACTION. *"X-ray Diffraction,"* by L. L. Wyman, *Steel,* vol. 109, No. 26, December 29, 1941, pp. 62-63, 65. In establishing standards for the comparison of X-ray diffraction patterns, it is essential to have a pure material for a standard and to make precise measurements of line positions and intensities on the diffraction pattern. The study of hardening processes usually involves the precipitation of a segregate phase such as an intermetallic compound or a carbide. The usual procedure of preparing a residue, how diffraction patterns are made on the residue and the value in making a residue are explained. The author presents data on what to do when alloy systems and transformations are involved. For general identification work only a few types of cameras are necessary and these are discussed by the author in closing his article. (Te.)

March Chapter Meeting Schedule

March 2

Central Indiana
Washington Hotel, Indianapolis
L. P. ROBINSON, Werner G. Smith Co.
"Variables Which Affect the Baking of Cores"

✦

Metropolitan
Essex House, Newark, N. J.
"Quiz Program"

✦ ✦

March 6

Western New York
Hotel Touraine, Buffalo
Representative of Pangborn Corp.
"Casting Cleaning"

✦ ✦

March 9

Chicago
Top of the Town Restaurant
Discussion Groups:
Gray Iron and Malleable
A. F. HECKENDORF, Illinois Malleable Iron Co.
Steel—MARTIN RINTZ, Continental Roll & Steel Foundry Co.
Non-Ferrous—FRED RILEY, Liquid Carbonic Corp.

✦

Michiana
Hotel La Salle, South Bend, Ind.
H. W. DIETERT, Harry W. Dietert Co.
"Foundry Sand Control"
Sound Motion Picture—*"Sand"*

March 12

Northeastern Ohio
Cleveland Club, Cleveland
R. C. GOOD, Electro Metallurgical Sales Co.
"Foundry Substitutions"

✦

St. Louis
De Soto Hotel
L. E. EVERETT, Kaukauna Machine Corp.
"Foundry Engineering"

✦ ✦

March 13

Central New York
Cornell University, Ithaca
Laboratory Session on Physicals

✦

Philadelphia
Engineers Club
A. B. KINZEL, Union Carbide & Carbon Research Labs.
"Gray Iron Night"

✦

Toledo
Hotel Hillcrest
E. C. HOENICKE, Foundry Div., Eaton Mfg. Co.
"Green Sand Molding of Valve Lifters"

✦

Northern California
Lake Merritt Hotel, Oakland
Sectional Meeting

March 16

Quad City
LeClaire Hotel, Moline
L. P. ROBINSON, Werner G. Smith Co.
"Variables Which Interfere With Proper Baking of Cores"

✦

Twin City
University of Minnesota
D. B. MILWARD
Electro Refractories & Alloys Corp.

✦ ✦

March 20

Wisconsin
Hotel Schroeder, Milwaukee
Sectional Meetings
Gray Iron—*"Crystallization and Solidification of Gray Iron in Pictures"*
DR. C. W. MASON, Cornell University
Malleable—*"Advanced Molding Practice and Equipment"*
H. E. FELLOW, Milwaukee Molding Machine Co.
Steel—*"Heading and Gating"*
CARL HAERTEL, The Falk Corp.
N. KOCH, Milwaukee Steel Foundry Div., Grede Foundries, Inc.
Non-Ferrous—*"Aluminum Castings"*

✦ ✦

March 27

Ontario
Royal York Hotel, Toronto
"Gating and Risering"
Malleable—J. CUNNINGHAM
International Malleable Iron Co.
Gray Iron—THOS. CLOUGH
Dominion Wheel & Foundries
Non-Ferrous—JAS. DALBY
Canada Metal Co., Ltd.

The program and exhibits at the Foundry Congress will demonstrate what the entire Castings Industry is doing toward waging and winning the war. Through technical sessions, informative talks, exhibits of equipment and supplies, ordnance exhibits, government "clinics" and displays, and above all, through personal contacts with men, materials and machines — the Congress will inspire solutions for many problems created by the war, such as:

- **CASTINGS FOR WAR.** Cast parts needed for war equipment — opportunities for foundrymen — distribution of production.
- **GOVERNMENT REGULATIONS.** Priorities — materials restrictions — contract distribution — price administration.
- **MATERIALS FOR PRODUCTION.** Availability of supplies — conservation of materials — possibilities for substitutes.
- **USE OF EQUIPMENT.** New equipment available — replacement of equipment — maintenance — possibilities for adapting present machines and tools to war work.
- **INCREASING EFFICIENCY.** Problems arising from high production schedules — increasing man-hours — job evaluation and time study experiences.
- **TRAINING OF MEN.** Apprentice and foreman training — training new workers — skilled labor problems — selectee service problems — engineering school instruction.
- **EMPLOYEE MORALE.** Importance of each worker to war effort — cooperation between management and employees — maintaining enthusiasm despite close application — prevention of rumor and sabotage.
- **SAFETY AND HYGIENE.** Educating new men to safety habits — accident prevention — fatigue problems — health precautions — plant defense and protection.